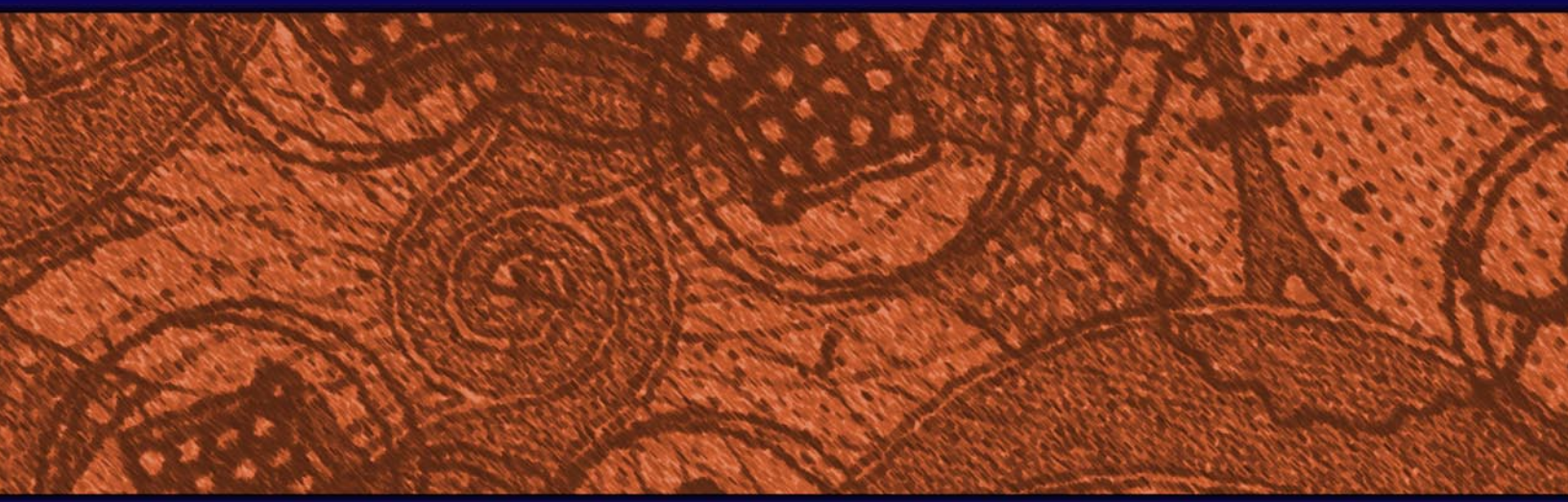
Final Report
ASU East — Backus Mall
December 2004



ASU Arizona State University East

CITY OF MESA
Great People, Quality Service!

MARICOPA ASSOCIATION of GOVERNMENTS

Prepared for ASU East, City of Mesa and the Maricopa Association of Governments by Sherman Group, Inc.

FINAL REPORT

ASU EAST — BACKUS MALL SUMMARY

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ASU East Backus Mall Summary

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BACKGROUND

This project began as a pedestrian study of a portion of ASU East campus, originally the site of the Williams Air Force Base. It explored a number of ways through which a section of the study area, selected through the process of the study, could be improved to accommodate the projected growth of the campus, its pedestrian demands and MAG Pedestrian Area Policies and Requirements.

Twining, future Backus, Mall on ASU East campus is a vehicular traffic thoroughfare connecting the Williams Campus Loops North and South. It is an asphalt street with limited pedestrian access occurring on the West side of the Northern portion of the street, and the East side of the Southern portion. Both pedestrian routes are a maximum of 5′ in width and encounter a number of conflicts with vehicles. Additionally the routes, occurring on opposite sides of the street, do not connect with each other and are disjointed along the way. There is little shade along them, no places to sit and no pedestrian lighting during the evening hours.

Being one of the main connections to the center of campus, future Student Union Building and present Academic Center, this is one of the routes used by pedestrians coming mainly from the North residential areas. As identified in the Pedestrian Assessment Report, this route is an unpleasant and unsafe pedestrian access. As part of ASU East improvements to the campus core, this route was identified for closure to automobile traffic and left exclusively for pedestrian travel.

As an outcome of the Pedestrian Study, Twining (Backus) Mall was identified as the next logical area for improvement for a number of reasons. Primarily, this route connects the residential neighborhoods to the North, as well as to the South via a parking lot at the intersection of the mall with Williams Campus Loops South, to the proposed Student Union Building and the center of campus core. The Southern portion of this route connects the core with the recently remodeled Faculty Offices immediately South of the future Student Union Building as well as the two dormitories adjacent to the Williams Campus South Loop. Finally, with the completion of Phase I of ASU East campus core improvements, this particular route is the next logical area for development and connection to completed improvements to the West.

OPPORTUNITIES

This Project offers a unique opportunity to develop an automobile street into one of the main pedestrian malls on the ASU East campus providing a number of improvements to the pedestrian condition such as shade, plantings, color, lighting, art opportunity etc.

In analyzing the site, studying the existing conditions and determining the constraints and potential, a conceptual design was developed for the mall in its entirety. After some budgetary evaluations it was proposed that a portion of the conceptual layout be designated for construction documents. After some discussion with the core group and introduction of the conceptual design for Twining (Backus) Mall to the interested public at the Public Meeting, an area for design documents was selected and approved by all involved parties.

This area was chosen due to its proximity to improvements already being implemented.

BACKUS MALL DESIGN

Once the area was chosen, Sherman Group proceeded with finalizing and fine tuning the conceptual design presented to the public and ASU East for the entire length of the mall. As design progressed and review sessions followed, a number of additional amenities were added. Among these were the addition of a traffic table and a drop off area at the southern end of the mall. Materials were selected, changes to parking facilities incorporated, and the design metamorphosed into a flowing stream for pedestrian use connecting the now completed Student Union building with staff buildings, dormitories, parking and residential neighborhoods to the south. With the design not yet complete, ASU East staff, excited about the possibilities, proceeded with fundraising for the project and have gathered together enough contributors to begin construction of a portion of the design.

Being the first major mall design for the campus, Backus Mall will serve as a catalyst for pedestrian improvements on the campus. It has already brought excitement here, and together with the other improvements, done or in progress, will only advance ASU East staff's and student's desires to better their environment and turn their campus into a space that will draw others to it. A space that is conducive to both relaxation and learning because it is comfortable and safe to be in.

Regionally this study and subsequent design project can be applied to any campus situation that is in need of pedestrian improvements.

Finally, if there is anything to be learned form this process, it is that when people dedicated to improving their environment get together, their ideas will ultimately be realized. Together with the staff from MAG, ASU East, City of Mesa and a number of interested individuals who showed up for the public meetings and contributed their ideas, Sherman Group was able to produce these design drawings for the betterment not of only ASU East bat the larger community.

Project Specifications

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SPECIAL PROVISIONS

1. SCOPE OF WORK:

The work on this project consists of construction of Pedestrian Improvements for Arizona State University from South Loop Road, North to Utah Mall and interface with the new Student Union. Work shall include site grading, concrete sidewalks of various surface finishes, concrete header, concrete curb, asphalt pavement, furniture, lighting, intersection layout, paver treatments, pedestrian ramps, removals, existing irrigation adjustments, landscaped areas, landscaping, irrigation system, all other incidentals to construction and as illustrated and defined on the plans and with in project specifications.

2. DEFINITIONS:

A. Section: Reference to a Section on the Plans or in these Specifications shall mean a Section of the "Uniform Standard Specifications for Public Works Construction" sponsored and distributed by Maricopa Association of Governments (MAG), latest revision. The provisions of MAG Uniform Standard Specifications and Details for Public Works Construction, which are not altered or modified by the drawings or by these Special Provisions or by any subsequently issued Addendum, shall apply to the contract even though the Contractor's attention is not specifically drawn to such provisions.

B. Standard Detail: Reference to a MAG Standard Detail (MAG S.D..) on the plans or in these specifications shall mean a standard detail drawing in the latest revision of the Uniform Standard Specifications for Public Work Construction, sponsored and distributed by Maricopa Association of Governments. City of Phoenix Standard Detail shall mean a standard detail drawing in the City of Phoenix Supplemental Standard Details for Public Works Construction, latest revisions.

C. Engineer: Any reference to Engineer shall mean the Owner or Owner representative such as a Landscape Architect or Construction Project Manager for Arizona Sate University East.

3. LINES AND GRADES:

The Contractor shall provide line and grade boards or stakes at control points and at intervals not less than 50 foot The Contractor shall be responsible for construction stakes for line and grade. The Contractor shall be responsible for preserving all stakes set, as directed by engineer, and shall take all steps necessary to insure that stakes are not disturbed or tampered with, and if in the area of any discrepancy, the stakes set are missing, moved or disturbed, the Contractor shall be responsible for the costs incurred to restake, remove and replace that portion of project where the discrepancy occurs.

Payment for line, grade and locations will be incidental to the cost of construction and included in all unit prices for construction elements. Contractor shall provide a continuous uniform grade between new walkways to be constructed and existing walkways to remain. All work associated with construction staking shall be the responsibility of the contractor and shall be incidental to the cost of construction.

4. SUSPENSION OF WORK:

The Engineer reserves the right to suspend the work wholly or in part if deemed necessary for the best interest of the City. This suspension will be without compensation to the Contractor, other than to adjust the contract time in accordance with Section 108.

5. COMPLIANCE WITH MANUFACTURERS' INSTRUCTIONS:

In all instances wherein the item and/or specifications require installation or construction in accordance with either manufacturer's or supplier's recommendations and/or instructions, said recommendations and/or instructions shall be submitted with the applicable portions clearly marked for approval prior to the commencement of work on that item or portion of the contract.

6. TRAFFIC REGULATIONS:

6.1 All traffic affected by this construction shall be regulated in accordance with the City of Phoenix "Traffic Barricade Manual," and these Special Provisions. The following traffic restrictions are minimum requirements throughout the construction period:

6.1.1 All traffic restrictions listed herein are to supplement the City of Phoenix "Traffic Barricade Manual", and are not intended to delete any part of the manual. All reference in the "Traffic Barricade Manual" to "arterial" and/or "collector" streets shall mean "major" streets.

6.1.2 A minimum of two travel lanes (one for each direction) shall be maintained open to traffic at all times on all major streets. All work that enters or crosses a major street must be done at times other than 7: 00 a.m. to 9:00 a.m., and 4:00 p.m. to 6:00 p.m.

6.1.3 A travel lane shall be defined as ten feet of roadway with a safe motor vehicle operating speed of twenty-five miles per hour.

6.1.4 A travel lane will not be considered as satisfactorily open to traffic until it has been graded reasonably smooth and is maintained dust free in an approved manner.

6.1.5 The Contractor shall provide and maintain all necessary traffic controls, and must provide flashing arrow boards to protect and guide traffic, for all work in the construction area.

6.1.6 Intersection area shall be defined as all of the area within the right-of-way of intersecting streets, plus 250 feet beyond the edge of the intersected right-of-way on all legs of the intersection.

6.1.7 The Contractor shall maintain all existing traffic signs erect, clean and in full view of the intended traffic at all times. Street name signs at major street intersections shall be maintained erect at all times. If any signs interfere with construction, the Contractor shall notify the Inspector at least 48 hours in advance for City forces to remove said signs. The contractor shall be responsible for having all temporary traffic control signs installed and maintained during construction. The Traffic Engineering Division will reset all traffic and street name signs to permanent locations when notified by the Engineer that construction is complete.

6.1.8 Local access to all properties on the project shall be maintained at all possible times in the form of a safe and reasonable direct route to at least one of the above defined major streets. Whenever local access cannot be maintained, the Contractor shall notify the affected property owner or user and the Engineer at least twenty-four hours in advance.

6.1.9 The contractor shall prepare a traffic control plan for the project and submit it to the Campus traffic Engineer for review and approval at least seven working days before the preconstruction conference. The traffic control plan shall include flashing arrow boards, barricades and signs, and shall address how local access to adjacent properties will be handled in accordance with the specifications herein. Any changes to the traffic control plan during construction shall be submitted to the Engineer for approval at least 72 hours before implementation.

Payment for this item shall be made at the contract lump sum price for TRAFFIC CONTROL.

6.1.10 Should it become imperative for the Contractor to close off a portion of any minor street, he must obtain approval from the Campus Traffic Engineer twenty-four (24) hours prior to closing. He must provide all the necessary signs to detour traffic. The maximum amount of time that the street may be closed is from 9:00 a.m. until 4:00 p.m.

7. ENERGIZED AERIAL ELECTRICAL POWER LINES:

The utility company maintains energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum ten (10) feet clearance between the lines and all construction equipment and personnel. (See: OSHA Standard 1926.550(a)15.) As an additional safety precaution, contractors should also be instructed to call the utility company to arrange, if possible, to have these lines de-energized or relocated when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. The utility company can often respond to such request if two days advance notice is given, but some situations may require up to sixty (60) days lead time for relocation or other arrangements.

8. RECORD DRAWINGS:

The contractor shall maintain one set of contract drawings with all changes, deviations, additions and deletions clearly marked thereon. Upon completion of the work, this set of drawings, shall be marked "RECORD DRAWINGS," dated, and delivered to the Engineer prior to approval of the Contractor's final payment request.

9. CASH FLOW REPORT:

The Contractor shall prepare a Cash Flow Report for projected monthly project cash flow on a ASU provided form and submit it for approval prior to issuance of the Notice to Proceed. The accumulation of monthly pay estimate costs shall be plotted versus time in accordance with the proposed construction schedule. After Approval, the Contractor shall submit an updated Cash Flow Report prior to the receipt of each Progress Payment. Each updated Cash Flow Report shall reflect the Contractor's actual monthly payment versus the actual elapsed contract time.

At ASU's request, if the projected monthly project cash flow varies by more than ten percent of the total contract price, the contractor shall prepare a revised Cash Flow Report. Each revised Cash Flow Report is subject to approval by ASU prior to issuance of the progress payment

Revisions to the report resulting from Contractor initiated delays or work schedule changes shall be at no cost to ASU. Any revisions required by ASU initiated delays or changes to the work shall be paid as an integral part of the approved Change Order.

10. ALLOWENCE FOR CONSTRUCTION CONTINGENCY:

Work under this section shall consist of any additional work identified by the owner and contractor due to construction activity. All work under this item shall be itemized as per MAG requirements and deducted from the set amount of $133,247.00. All additional work under this item shall be approved by the resident engineer or landscape architect and the ASU EAST prior to commencing. All work under this section shall include but is not limited to all necessary materials, tools, layout, survey and labor required to complete each task.

Measurement and payment for this item shall be made on individual basis per task and as described above. Limit for this item is set at $133,247.00 on bid form under line item CONTINGENCY.

11. MOBILIZATION/DEMOBILIZATION:

The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

The Contractor shall obtain approval of the Engineer when using vacant property to park and service equipment and store material for use on this project.

A. The Contractor shall notify adjacent property owners/residents of this proposed use.

B. Any use of vacant property adjacent to or near the project for parking or servicing equipment and/or storing of material will require the Contractor to obtain written approval from the property owner i.e. ASU East. This approval shall contain any requirements which are a condition of this approval.

C. A copy of the property owner's approval shall be submitted along with the Contractor's request to the Engineer for approval for the use of the marshaling yard in connection with the project. An appropriate distance from adjacent property will be set by the Engineer on a case-by-case basis based on the size and type of equipment to be used on the project.

D. The yard shall be fenced and adequately dust-proofed in a manner such as to preclude tracking of mud onto paved City streets

E. Work in yard shall be scheduled so as to comply with the City noise Ordinance.

F. Equipment, materials, etc., shall be located so as to minimize impact on adjacent properties. A sound barrier may be required if deem necessary by the Engineer.

G. The Contractor shall clean up property promptly upon completion of use and shall provide a signed property release as a condition of final acceptance.

H. Contractor's request for approval shall specify in detail how he or she proposed to comply with (D) through (G) above.

Mobilization/Demobilization will be measured for payment by the lump sum as a single complete unit of work.

Payment for Mobilization/Demobilization, measured as provided above, will be made at the contract lump sum basis for MOBILIZATION/DEMOBILIZATION, which shall be full compensation for supplying and furnishing all materials, facilities and services and performing all the work involved as specified herein.

12. REMOVAL OF EXISTING IMPROVEMENTS NOT DESIGNATED FOR REMOVAL:

Prior to commencement of construction, the Contractor shall document and record location of all damaged concrete items within the project limits. This information shall be provided to the Engineer, ASU Representative for evaluation.

If the Engineer determines that any damaged item that will not be removed by planned construction should be replaced, the Engineer will direct the Contractor to replace the item.

The Engineer will provide the limits, and the line and grade of the replacement item.

The replacement of any item under this section shall be in accordance with the Uniform Standard Specifications and these Special Provisions.

Measurement and payment will be according to the bid units and unit price for removal of the associated item, and the bid units and unit price for construction of the new item as established in the bidding schedule.

This item does not apply to replacement of items damaged as a result of the Contractor's operation or negligence as determined by the Engineer. The Contractor is responsible for replacement of items damaged by his operations according to the Uniform Standard Specifications and these Special Provisions.

13. REMOVAL OF EXISTING IMPROVEMENTS:

The work under this section shall consist of the removal and disposal of any obstacle to construction, unless specifically called out on the plans to be removed or relocated and in performing all operations in connection with the removal of, but not limited to, concrete paving and bituminous paving, complete, and in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the contract, and to the "Uniform Standard Specifications for Public Works Construction" by the Maricopa Association of Governments. Work associated with this work shall be incidental to the cost of construction and contained in the related pay items

A. Equipment: The Contractor shall maintain on the job sufficient equipment of the types needed to complete the work in accordance with these specifications.

B. Monuments: Maintain carefully all bench marks, monuments, and other reference points; if disturbed or destroyed, have replaced or relocated by a registered land surveyor at the Contractor's expense.

C. Limits of Work: The drawings show Construction Limit lines for the purpose of identification, within which the demolition operations are to be confined and designates those structures that are to be removed.

D. Protection: The Contractor shall protect that which is to remain and shall conduct all demolition operations in a manner that will not damage or jeopardize the surrounding plant life, structures and property. Each Contractor shall verify utilities on site and in location of his work. All existing trees will be protected and not damaged.

E. Special Protection of Adjacent Properties: The Contractor shall be responsible to protect from damage all adjacent properties resulting from demolition and construction activities and shall provide repairs to the damage at no additional cost to the owner.

F. Saw Cutting: All necessary saw cutting will be incidental and any damage to portions not to be removed shall be repaired by the Contractor at no expense to the Owner.

14. UTILITIES:

A. Location of Underground Utilities: The Contractor shall notify the interested "utilities" and "Blue Stake" prior to start of construction, and shall ascertain the approximate locations of the various underground utilities either shown on the Plans and/or as may be brought to his attention. The exact locations of these underground utilities shall be determined by excavations made by the Contractor prior to any trenching operations. The Contractor shall comply with MAG Specification 105.6 to cooperate with the utility companies.

B. Damage to Existing Utilities: The Contractor shall assume full responsibility for all damage to all utilities, the locations of which have been made known to his operations, and shall repair the damaged utilities at his own expense.

C. Utility Locations: The exact location of all existing utilities, structures, and underground utilities indicated on the drawings, shall be determined by the Contractor and he shall conduct this work so as to prevent interruption of service or damage to them.

15. PROPERTY ACCESS:

Local access shall be maintained to all properties on the project at all possible times. When local access cannot be maintained, the Contractor must notify the affected property owner at least 24 hours in advance and restore access as soon as possible. Safe access to adjacent properties must be maintained at all times.

16. TRENCH EXCAVATION, BACKFILLING AND COMPACTION:

16.1 DESCRIPTION

The work included in this section of the specifications consists in furnishing all labor, equipment and materials and in performing all operations in connection with the excavation and backfilling of trenches, complete, and in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the contract, and to the "Uniform Standard specifications for Public Works Construction" by the Maricopa Association of Governments.

Excavation for appurtenance structures, such as manholes, inlets, transition structures, vaults, valve boxes, catch basins, areas with new and sidewalk replacement, etc., shall be deemed to be in the category of trench excavation. Cost shall be considered incidental to the cost of construction and no payment will be made for this item.

16.2 EXCAVATION:

A. General: The Contractor shall perform excavation of every description regardless of the character of materials encountered within the contract limit lines indicated on the drawings and including excavation ordered by the Engineer or compacted backfill for the purpose of making density tests on any portion of the lift. All excavation shall be open cut unless otherwise shown on the plans or approved by the Engineer, Owner representative. It is the Contractor responsibility to make his own determination as to actual existing conditions. Any unsatisfactory materials found within the limits of paving areas shall be excavated and replaced with suitable material compacted to match surrounding materials. Unsuitable materials shall be disposed of in accordance with these specifications or as directed by the Engineer.

B. Over-excavation: Except at locations where excavation of rock from the bottom of the trench is required, care shall be taken not to excavate below the depth indicated without approval from the Engineer.

Excavation below a specified grade line not approved by the Engineer shall be backfilled at the Contractor's expense with ABC material compacted to a uniform density of not less than 95 percent of the maximum density as determined by ASTM D1557 or AASHTO T-180.

Whenever rock is encountered in the trench bottom, it shall be over excavated to a minimum depth of six inches below the O.D. of the pipe. The over-excavation shall be filled with ABC compacted to a density of not less than 95 percent of the maximum density as determined by ASTM D1557 or ASSHTO T-180, at no additional cost to the City.

Whenever unsuitable soil incapable of supporting the pipe is encountered, the Contractor will notify the Engineer and a Field determination will be made as to the depth of over-excavation and the granular fill required, which will be considered extra work.

C. Excavation for Manholes, Valve, Inlets, Catch Basins, Park Equipment and other Accessories: The Contractor may excavate to place the concrete structure directly against the excavated surface, provided that the faces of the excavation are firm and unyielding and are at all points outside the structure lines shown on the plans. If the native material is such that it will not stand without sloughing or if precast structures are used, the Contractor shall over excavate to place the structure and this over-excavation shall be backfilled with ABC compacted to at least 95 percent of the maximum density as determined by ASTM D1557 or AASHTO T-180, at no additional cost to ASU East.

Any excavation below the elevation indicated for the foundation of any structure shall be filled with ABC and compacted to at least 95% of the maximum density as determined by ASTM D1557 or AASHTO T-180 at the expense of the Contractor.

D. Open Trench: Except where otherwise noted in the Special Provisions, or approved in writing by the Engineer, the maximum length of open trench, where the construction is in any stage of completion (excavation, pipe laying, or backfilling), shall not exceed 150 feet in the aggregate at any one location.

Any excavated area shall be considered open trench until all ABC for pavement replacement has been placed and compacted. With the approval of the Engineer, pipe laying may be carried on at more than one separate location, the restrictions of open trench applying to each location. Trenches across streets shall be completely backfilled as soon as possible after pipe laying.

Substantial steel plate with adequate trench bracing shall be placed across trenches, spike anchored and surrounded with temporary asphalt ramps at least one foot wide. Where trench backfill and temporary patches have not been completed during regular work hours, safe and convenient passage for pedestrians shall be provided directed at no additional expense. The Engineer, Owner representative may designate a passage to be provided at any point he deems necessary. Access to hospitals, police station, fire stations and fire hydrants must be maintained at all times.

16.3 BEDDING BACKFILLING AND COMPACTION:

A. Bedding: Bedding shall consist of granular material not containing pieces larger than one and one half inches and free of broken concrete, broken pavement, wood or any other organic matter. Granular material shall mean material for which the sum of the plasticity index and the percent of the material passing No. 200 sieve shall not exceed 23. Plasticity index shall be tested in accordance with AASHTO T-90.

B. Backfill: Backfill under improved areas shall be aggregate base course material, (ABC) in accordance with MAG standard Specifications including Section 702.

Backfill around utilities which are exposed during trench excavation shall be aggregate base course compacted to a uniform density of not less than 98 percent of the maximum density as determined by ASTM D1557 or AASHTO T-180.

16.4 COMPACTION DENSITIES:

A. Backfill: Backfill shall be thoroughly compacted to no less than the following densities when tested in accordance with ASTM D1557 or AASHTO T-180.

Type I: 100 percent of maximum density from surface to 2′ below surface. 95 percent of maximum density from 2′ below surface to bottom of trench including bedding.

Type II: 90 percent of maximum density from surface to bottom of trench including bedding.

The type of compaction density required shall be as indicated on the specifications, plan and details, and/or the Special Provisions.

16.5 COMPACTION METHODS:

A. Mechanical Compaction: Mechanical compaction shall be used to consolidate native and imported backfill material, and it may be used to consolidate granular material, select material, or aggregate base course.

The Contractor shall, at his own expense, remove or add moisture to the backfill material to maintain it within the range of +2 to -4 percent of the optimum moisture content. Backfill material outside these moisture limits shall be considered as unsuitable.

The backfill material shall be placed in uniform lifts not exceeding a loose thickness of 8 inches, and compacted uniformly with mechanical work methods approved by the Engineer utilizing equipment such as roller, pneumatic tamps, hydro-hammers or other devices which provide the required uniform compaction density without causing damages to the conduit, excavation, and adjacent structures or utilities. There will be no additional payment or time extension for this work.

17. CONTROL OF WORK AND MATERIALS:

Control of work and materials shall comply respectively with Sections 105 and 106 of the MAG Specifications, expect as modified by the "Special Provisions".

18. STOCKPILE OF MATERIALS:

The Contractor may place or stockpile materials in the public right-of-way provided they do not prevent access to adjacent properties or prevent compliance with traffic regulations.

Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintained.

SUPPLEMENTAL SPECIFICATIONS

1. REMOVE CONCRETE SIDEWALK, SLABS AND DRIVES

Work under this section shall include all saw cutting and removal of all existing concrete sidewalks, concrete pads and any existing driveways in the project scope designated for removal by the plans and specifications. Removed concrete will be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per square foot for SAWCUT AND REMOVE CONCRETE WALK SLABS AND DRIVES and shall include all necessary equipment, tools and labor needed to complete the work.

2. REMOVE CURB AND GUTTER

Work under this section shall include all saw cutting and removal of all existing concrete curb and gutter in the project scope designated for removal by the plans and specifications. Removed curb and gutter will be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per linear foot for SAWCUT AND REMOVE CONCRETE CURB AND GUTTER and shall include all necessary equipment, tools and labor needed to complete the work.

3. REMOVE EXISTING ASPHALT

Work under this section shall include all saw cutting and removal of all existing asphalt in the project scope designated for removal by the plans and specifications. Removed asphalt will be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per square yards for SAW CUT AND REMOVE EXISTING ASPHALTIC CONCRETE PAVEMENT and shall include all necessary equipment, tools and labor needed to complete the work.

4. REMOVE AND RESET SURVEY MARKER

Work under this section shall include the removal and re-setting of existing survey markers. Survey markers shall be reset as illustrated in the civil drawings and details and as per MAG standard detail 120-1. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per each for REMOVE AND RESET EXISTING SURVEY MARKER IN HANDHOLE and shall include all necessary layout, survey, equipment, tool and labor needed to complete the work.

5. ADJUST FRAME AND COVERS

Work under this section shall include the adjustment of any and all frames and covers designated as such by the civil plans. Adjustments shall bring the designated elements to match new grades set by the civil engineer and shall be done as per MAG standard detail 270.

Measurement and payment for this item shall be at the contract unit price per each for ADJUST FRAME AND COVER FOR SURVEY MONUMENTS, WATER VALVES, SEWER CLEANOUTS AND GAS VALVES TO NEW GRADE and shall include all necessary layout, survey, equipment, tool and labor needed to complete the work.

6. ADJUST MANHOLE FRAME AND COVERS

Work under this section shall include the adjustment of any and all Manhole frames and covers designated as such by the civil plans. Adjustments shall bring the designated elements to match new grades set by the civil engineer and shall be done as per MAG standard detail 420-2.

Measurement and payment for this item shall be at the contract unit price per each for ADJUST MANHOLE FRAME AND COVER and shall include all necessary layout, survey, equipment, tool and labor needed to complete the work.

7. RELOCATE FIRE HYDRANT

Work under this section shall include relocating existing fire hydrants as per MAG standard detail 360 and civil drawings.

Measurement and payment for this item shall be at the contract unit price per each for RELOCATE EXISTING FIRE HYDRANT and shall include all necessary materials, piping, tools, labor and layout needed to complete the work.

8. SALVAGE AND REUSE EXISTING TREES

Work under this section shall include the salvage and consequent replantinf of all trees indicated for Salvage. Salvaged trees shall be boxed up stored and taken care of as per INDIGENOUS LANDSCAPE SALVAGING STORING AND TRANSPLANTING section of these specifications. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per each for SALVAGE AND REUSE EXISTING TREES and shall include all necessary materials, tools and labor, nursery location, fencing, irrigation, pruning, maintenance and replacements for damaged and dead plant material needed to complete the work.

9. REMOVE EXISTING TREES

Work under this section shall include the removal of all trees indicated for removal. Removal of trees shall include removal of the rootball as well as the canopy, branches and trunk. Removed trees shall be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per each for REMOVE EXISTING TREES and shall include all necessary materials, tools and labor needed to complete the work.

10. REMOVE EXISTING PALMS

Work under this section shall include the removal of all palms indicated for removal. Removal of palms shall include removal of the rootball as well as the canopy and trunk. Removed palms shall be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per each for REMOVE EXISTING PALMS and shall include all necessary materials, tools and labor needed to complete the work.

11. SALVAGE AND REUSE EXISTING SAGUAROS

Work under this section shall include the salvage and consequent replantinf of all saguaros indicated for Salvage. Salvaged trees shall be boxed up stored and taken care of as per INDIGENOUS LANDSCAPE SALVAGING STORING AND TRANSPLANTING section of these specifications. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per each for SALVAGE AND REUSE SAGUAROS and shall include all necessary materials, tools and labor, nursery location, fencing, irrigation, pruning, maintenance and replacements for damaged and dead plant material needed to complete the work.

12. UNDERGROUND EXISTING UTILITIES

Work under this section shall include the under-grounding of existing utilities designated by civil and electrical plans. Under-grounding of utilities shall be done by utility company personnel and shall adhere to all safety standards and regulations set by the utility company and the Corporation Commission.

Measurement and payment for this item shall be at the contract unit price per lump sum for UNDERGROUND UTILITIES and shall include all necessary layout, materials, tools and labor needed to complete the work.

13. REMOVE UTILITY POLE

The work under this section consists of removal of existing power poles indicated on the plans. Work under this section shall consist of removal of poles and utility wiring associated with the poles and shall include but not be limited to all necessary electrical adjustments, wiring, conduit, footings, mounting hardware, connection to electrical service, down guy removal etc in order to provide a completely operational and uninterrupted electrical/telephone service. Under-grounding of displaced utilities is covered under the previous item. Removed power poles and associated hardware shall be delivered to ASU East maintenance yard.

Payment for this work shall be on an each basis for REMOVE UTILITY POLE, and shall include all labor, tools, materials and any of the elements discussed above as incidentals to the work.

14. REMOVE STREETLIGHTS

The work under this section consists of removing existing power poles and associated street lights at locations indicated on the plans. Work under this section shall consist of removing poles, lights and utility wiring associated with the poles and shall include but not be limited to all necessary electrical adjustments, wiring, conduit, removal of footings, mounting hardware, connection to electrical service, down guy etc in order to provide a completely uninterrupted service once the pole has been removed. Removed poles and associated hardware shall be delivered to ASU East maintenance yard.

Payment for this work shall be on an each basis for REMOVE EXISTING STREETLIGHTS, and shall include all labor, tools, materials and any of the elements discussed above as incidentals to the work.

15. RELOCATE STREETLIGHTS

The work under this section consists of relocating existing power poles and associated street lights to locations indicated on the plans. Work under this section shall consist of relocating poles, lights and utility wiring associated with the poles and shall include but not be limited to all necessary electrical adjustments, wiring, conduit, foundations, mounting hardware, connection to electrical service, pull boxes, down guy etc in order to provide a completely operational street lights in the new location.

Payment for this work shall be on an each basis for RELOCATE EXISTING STREETLIGHTS, and shall include all labor, tools, materials and any of the elements discussed above as incidentals to the work.

16. RELOCATE EXISTING STOP SIGNS

Work under this section shall include the relocation of existing traffic stop signs to new locations indicated on the civil plans. Relocation of poles and associated footings shall be incidental to the unit price.

Measurement and payment for this item shall be at the contract unit price per each for RELOCATE EXISTING TRAFFIC CONTROL SIGNS and shall include all necessary materials, footings. mounting hardware, tools, poles, labor and layout needed to complete the work.

17. REMOVE EXISTING TRAFFIC CONTROL SIGNS

Work under this section shall include the removal of existing traffic stop signs and returning them to the appropriate department with in ASU East. Removal of signs shall include removal of associated poles and footings as incidental to the unit price.

Measurement and payment for this item shall be at the contract unit price per each for REMOVE EXISTING TRAFFIC CONTROL SIGNS and shall include all necessary materials, tools and labor needed to complete the work.

18. REMOVE EXISTING CATCH BASIN

Work under this section shall include the removal of existing catch basin indicated by civil plans. Removed concrete will be hauled from the site and disposed of appropriately as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner. Any fill necessary to reestablish finished grade shall be considered incidental to the cost of the item.

Measurement and payment for this item shall be at the contract unit price per each for REMOVE EXISTING CATCH BASIN and shall include all necessary materials, tools and labor needed to complete the work.

19. REMOVE DRAINAGE CONNECTING PIPE

Work under this section shall include the removal of drainage connecting pipes from existing catch basin to the new tie-in location. Appropriate disposal of the pipe and any necessary backfill shall be viewed as incidental to the unit price. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner.

Measurement and payment for this item shall be at the contract unit price per linear foot for REMOVE EXISTING CATCH BASIN CONNECTING PIPE and shall include all necessary equipment, tools and labor needed to complete the work.

20. INSTALL NEW CATCH BASIN

Work under this section shall include the installation of a new catch basin as indicated by civil plans. Installation of the catch basin shall comply with MAG standard detail #534-1 for Type "E" basin as well as any appropriate section of the MAG manual. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner. Any excavated fill shall be removed from site and considered incidental to the cost of the item.

Measurement and payment for this item shall be at the contract unit price per each for INSTALL NEW CATCH BASIN and shall include all necessary repairs, layout, survey, materials, tools and labor needed to complete the work.

21. INSTALL NEW CONNECTING PIPE

Work under this section shall include the installation of a new catch basin connecting pipe. The pipe shall connect the basin with the storm drain at invert elevations indicated on the grading and drainage plans. Installation of any required elbows, joints and the use of any sealant shall be considered incidental to the cost of this item. Pipe shall be a 15" RGRCP connecting pipe. Any damage to existing and surrounding utilities and or any other elements shall be repaired by the contractor at no additional cost to the owner. Any excavated fill shall be removed from site and considered incidental to the cost of the item.

Measurement and payment for this item shall be at the contract unit price per linear foot for NEW 15" RGRCP CONNECTING PIPE and shall include all necessary layout, survey, materials, tools and labor needed to complete the work.

22. CONCRETE CURB AND GUTTER

Vertical Concrete Curb and gutter shall be in accordance with MAG Standard detail 220 Type 'A', civil plans and layout, specifications and as modified by the plans.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW 6" CURB AND GUTTER Type "A" PER MAG STANDARD DETAIL 220 and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

23. CONCRETE ROLLED CURB AND GUTTER

Vertical Concrete Curb and gutter shall be in accordance with MAG Standard detail 220 Type 'C', civil plans and layout, specifications and as modified by the plans.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW ROLLED CURB AND GUTTER Type "C" PER MAG STANDARD DETAIL 220 and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

24. CONCRETE SINGLE VERTICAL CURB

Vertical Concrete Curb shall be in accordance with MAG Standard detail 222 Type 'A', civil plans and layout, specifications and as modified by the plans.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW 6" SINGLE VERTICAL CURB Type "A" PER MAG STANDARD DETAIL 222 and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

25. CONCRETE CURB AND GUTTER TRANSITION

Vertical Concrete Curb and gutter transitions shall be in accordance with civil plans, specifications and layout.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for CONSTRUCT NEW 5' CURB AND GUTTER TRANSITION and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

26. EXPOSED AGGREGATE HEADER 8"

Exposed aggregate header shall be constructed as per layout and civil plans and details. Header shall be a depth of 8" and a width of two feet. Header shall be composed of colored concrete to match ASU Grey. Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days. Contractor to use 3/8" rock for exposed aggregate concrete.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 8" EXPOSED AGGREGATE HEADER and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

27. CONCRETE SIDEWALK 8" MEDIUM SALT FINISH

Concrete Sidewalk shall be in accordance with the appropriate MAG Standard details and specifications and as modified by the plans. Walks shall be of the size and thickness shown on the drawings to match existing and as required by Section 340 of the Uniform Standard Specification. Contractor shall construct concrete walks to grades to match existing with adjustments to provide grades of walkways in a smooth consistent manner as directed by the Engineer. 8" Concrete walks include all concrete flatwork including pads, etc, as identified on the plans.

Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days. Contractor to use 3/8" rock for exposed aggregate concrete.

The exposed surface of concrete walks shall be finished in a manner detailed and described in the drawings. Scoring grooves shall be constructed at right angles to the centerline of the walk. These grooves shall extend to 1/4 the depth of the pavement, shall be not less than 1/8 inch and not more than 1/4 inch in width, and shall have the edge rounded 1/4 inch. Walks shall be edged with an edging tool. The edging tool shall be rounded to 1/4inch radius. Contractor shall submit shop drawings of concrete scoring pattern, expansion joint placement and concrete placement sequence and receive approval by engineer prior to concrete placement.

Bituminous felt expansion joints 1/2 inch thick shall be installed transversely across concrete walks, where new walks meet existing walks, walls and buildings. They shall also be installed at intervals as detailed on the drawings and or as per appropriate MAG sections.

Where new concrete walks abut new and existing curbs, walks, or walls, bituminous felt expansion joints shall be installed. The top of the expansion material shall be set 1/2 inch below finished concrete surface.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 8" CONCRETE SIDEWALK MEDIUM SALT FINISH and shall include all sub grade preparation, materials, tools, turndown edges, labor excavation, compaction and layout necessary to complete the work.

28. CONCRETE SIDEWALK 8" CRUSHED GLASS SURFACE

Concrete Sidewalk shall be in accordance with the appropriate MAG Standard details and specifications and as modified by the plans. Walks shall be of the size and thickness shown on the drawings to match existing and as required by Section 340 of the Uniform Standard Specification. Contractor shall construct concrete walks to grades to match existing with adjustments to provide grades of walkways in a smooth consistent manner as directed by the Engineer. 8" Concrete walks include all concrete flatwork including pads, etc, as identified on the plans.

Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days. Contractor to use 3/8" rock for exposed aggregate concrete.

The exposed surface of the concrete walks shall be finished in a manner detailed and described in the drawings and as described in the CRUSHED GLASS SURFACE section of these specifications. Scoring grooves shall be constructed at right angles to the centerline of the walk. These grooves shall extend to 1/4 the depth of the pavement, shall be not less than 1/8 inch and not more than 1/4 inch in width, and shall have the edge rounded 1/4 inch. Walks shall be edged with an edging tool. The edging tool shall be rounded to 1/4inch radius. Contractor shall submit shop drawings of concrete scoring pattern, expansion joint placement and concrete placement sequence and receive approval by engineer prior to concrete placement.

Bituminous felt expansion joints 1/2 inch thick shall be installed transversely across concrete walks, where new walks meet existing walks, walls and buildings. They shall also be installed at intervals as detailed on the drawings and or as per appropriate MAG sections.

Where new concrete walks abut new and existing curbs, walks, or walls, bituminous felt expansion joints shall be installed. The top of the expansion material shall be set 1/2 inch below finished concrete surface.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 8" EXPOSED AGGREGATE CONCRETE SIDEWALK CRUSHED GLASS SURFACE and shall include all sub grade preparation, materials, tools, turndown edges, labor excavation, compaction and layout necessary to complete the work.

29. CONCRETE SIDEWALK 8" WITH MEXICAN BEACH PEBBLES

Sidewalk shall be constructed as per plans and specific details. Pebbles are to be embedded in to the concrete such that the finished grade of the pebbles matches adjacent walks. Pebbles are to be 2"-4", black and be hand embedded with the narrow side such that only 1/3 of each is exposed above the surface of the concrete. Pebbles shall be placed up against each other to form a continuous surface with minimum amount of concrete showing between them.

Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 8" CONCRETE WALK WITH EMBEDDED BLACK MEXICAN BEACH PEBBLES and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

30. CONCRETE HEADER 8" WITH COPPER PLATED STEEL INSERT

Concrete aggregate header shall be constructed as per layout and civil plans and details. Header shall be a depth of 8" and a width of one foot. A copper plated steel ribbon shall be embedded into the wet header as illustrated by the plans and details. Contractor to provide shop drawings of ribbon breakdown and a sample of the finished product prior to proceeding with production and installation.

Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days. Contractor to use 3/8" rock for exposed aggregate concrete.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 8" CONCRETE HEADER WITH COPPER PLATED STEEL INSERT and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

31. EXPOSED AGGREGATE HEADER 4"

Exposed aggregate header shall be constructed as per layout and civil plans and details. Header shall be a depth of 4" and a width of two feet. Header shall be composed of colored concrete to match ASU Grey. Contractor to use 3/8" rock for exposed aggregate concrete.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 4" EXPOSED AGGREGATE HEADER and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

32. CONCRETE SIDEWALK 4" MEDIUM SALT FINISH

Concrete Sidewalk shall be in accordance with the appropriate MAG Standard details and specifications and as modified by the plans. Walks shall be of the size and thickness shown on the drawings to match existing and as required by Section 340 of the Uniform Standard Specification. Contractor shall construct concrete walks to grades to match existing with adjustments to provide grades of walkways in a smooth consistent manner as directed by the Engineer. 4" Concrete walks include all concrete flatwork including pads, etc, as identified on the plans.

The exposed surface of concrete walks shall be finished in a manner detailed and described in the drawings. Scoring grooves shall be constructed at right angles to the centerline of the walk. These grooves shall extend to 1/4 the depth of the pavement, shall be not less than 1/8 inch and not more than 1/4 inch in width, and shall have the edge rounded 1/4 inch. Walks shall be edged with an edging tool. The edging tool shall be rounded to 1/4inch radius. Contractor shall submit shop drawings of concrete scoring pattern, expansion joint placement and concrete placement sequence and receive approval by engineer prior to concrete placement.

Bituminous felt expansion joints 1/2 inch thick shall be installed transversely across concrete walks, where new walks meet existing walks, walls and buildings. They shall also be installed at intervals as detailed on the drawings and or as per appropriate MAG sections.

Where new concrete walks abut new and existing curbs, walks, or walls, bituminous felt expansion joints shall be installed. The top of the expansion material shall be set 1/2 inch below finished concrete surface.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW 4" CONCRETE SIDEWALK MEDIUM SALT FINISH and shall include all sub grade preparation, materials, tools, turndown edges, labor excavation, compaction and layout necessary to complete the work.

33. CONCRETE WALK TO MATCH EXISTING

Concrete sidewalk to match existing shall match the material that it is intended to replace. New walk shall match the propertied of the previously existing walk. These properties shall include the thickness of the walk, its color, finished surface treatment, score pattern and or any facades that may have been placed on the surface of the walk.

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for NEW CONCRETE SIDEWALK TO MATCH EXISTING and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

34. PEDESTRIAN LIGHTS

The work under this section consists of furnishing and installing light poles, foundation, base plate arms, luminaries, wiring, conduit and all miscellaneous material installation of pedestrian lighting and miscellaneous electrical service providing a fully operation lighting and electrical system per specifications plans and details. Pedestrian light pole and luminare fixture manufacturer and model shall be as indicated on the Electrical sheets of the construction documents. Two models are to be utilized. For pedestrian nodes contractor to utilize pedestrian lights as manufactured by ECLATEC, model CITY LINE OBLIC-SET inclusive of luminaire and pole, colors as selected by ASU East. For the remainder of the mall contractor to utilize lights as manufactured by SPALDING, model #EL1-FM-SF-S150-BS-MT-DBZ-NCS-LAMP and 14'-SQST-411-DBZ4"SSS-POLE. See electrical drawings for locations of each particular model

Payment will be made at the contract each sum price for PEDESTRIAN LIGHTING COMPLETE and lump sum for ELECTRICAL CONNECTION COMPLETE and shall include all materials, tools, labor and layout necessary to complete and install new electrical and lighting system including but not limited to all footings, poles fixtures, junction boxes, pull boxes, wiring, conduit controls, coordination with utilities, control cabinets, power connection, service panels, and all other electrical work indicated on the plans and specifications complete.

35. BOLLARDS

Contractor shall furnish and install bollards as manufactured by WAUSAU TILE, model #SB24 SPEAR BOLLARD-B3 265 to be located and mounted onto concrete footings as incidental to the unit price. Bollards shall be permanently installed as per manufacturer's specifications and details on the drawings.

Payment will be made at the contract price per each for NEW BOLLARDS and shall include all materials, tools, labor, bolts, concrete footings and layout necessary to complete and install.

36. TREE GRATE

Contractor shall furnish and install steel tree grates as manufactured by URBAN ACCESSORIES, model #FLAT RAINBOW 4'RD to be located as illustrated by the plans. Tree grates shall be installed as per manufacturer's specifications and details on the drawings.

Payment will be made at the contract price per each for NEW TREE GRATES and shall include all materials, tools, labor, bolts, concrete footings and layout necessary to complete and install.

37. TRASH RECEPTACLE

Contractor to furnish and install steel trash receptacles as shown on the drawing and as directed in the field by the engineer. Receptacle shall be as selected by ASU East. Contractor to obtain manufacturer and model information prior to bid. Receptacles shall be permanently installed as per manufacturer's specifications and details. Location shall be as directed in the field by the engineer.

Payment will be made at the contract price per each NEW TRASH RECEPTACLE and shall include all materials, tools, labor bolts, installation and layout necessary to provide and install complete.

38. BENCH

Contractor shall furnish and install steel benches with back as selected by ASU East. Contractor to obtain manufacturer and model information prior to bid. Benches to be located and bolted onto concrete flatwork. Benches shall be permanently installed as per manufacturer's specifications and details.

Payment will be made at the contract price per each for NEW 6' BENCH and shall include all materials, tools, labor bolts, concrete footings and layout necessary to complete and install.

39. BIKE RACKS

Contractor shall furnish and install steel bike racks as selected by ASU East. Contractor to obtain manufacturer and model information prior to bid. Bike racks to be located and bolted onto concrete flatwork. Bike racks shall be permanently installed as per manufacturer's specifications and details on the drawings.

Payment will be made at the contract price per each for NEW BIKE RACKS and shall include all materials, tools, labor bolts, concrete footings and layout necessary to complete and install.

40. EMBEDDED RETAINING WALL

Embedded retaining wall shall be constructed as per plans and details. The wall shall be reinforced and tied into the adjacent sidewalk with rebar reinforcement as shown. Wall shall be finished in exposed aggregate and colored to match adjacent exposed aggregate header.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW EMBEDDED RETAINING WALL / SIDEWALK and shall include all sub grade preparation, materials, tools, forming, labor excavation, compaction, survey and layout necessary to complete the work.

41. NEW HANDRAIL

New handrail shall be constructed as per design plans produced by Arizona Sate University East. Contractor to obtain plans from ASU East prior to bid and construction.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW HANDRAIL AS DESIGNED BY ASU EAST and shall include all, materials, tools, labor, installation, transportation, and layout necessary to complete the work.

42. NEW RETAINING WALL W/ BENCH

New retaining walls shall be constructed as per plans and details. The walls shall be reinforced as shown. Walls shall be finished by carrying through it the materials of the paved surface below as indicated in the details. Stainless steel benches and planter pots located on columns shall be provided as an incidental to construction. Planter pots shall have irrigation sleeves though the columns to the base of the pot. Sleeves shall be large enough to accommodate an irrigation line as well as drainage from the pot back to the ground. Masonry contractor is to coordinate construction of columns with the irrigation contractor in order to adequately meet irrigation requirements. Contractor to provide shop drawings of bench for approval prior to fabrication.

Measurement and Payment for this work shall be paid for at the contract unit bid price per linear foot for NEW RETAINING WALL / CANTILEVER BENCH COMBINATION and shall include all sub grade preparation, materials, tools, forming, labor excavation, compaction, survey and layout necessary to complete the work.

43. PEDESTRIAN RAMPS:

Pedestrian ramps shall be in accordance with the special details on the plans and appropriate MAG Standard Details and Specifications. Pedestrian Ramp installation shall be paid for at the contract unit bid price for NEW HANDICAP ACCESS RAMPS and NEW HANDICAP ACCESS RAMPS "SCOOP RAMP" per each and shall include all materials, tools, labor and layout necessary to complete the work.

44. INSTALL NEW TRAFFIC SIGNS

Work under this section shall include the provision and installation of city and traffic approved traffic signs as per all appropriate traffic manual sections and details. Traffic signs shall be "Pedestrian Crossing Ahead" signs in appropriate colors, mounted to pole.

Measurement and payment for this item shall be at the contract unit price per each for INSTALL NEW "PEDESTRIAN CROSSING AHEAD" SIGNS and shall include all necessary materials, tools, labor, poles, footings and layout needed to complete the work.

45. PAVEMENT MARKINGS

After completion of asphaltic concrete compaction, paint traffic markings as shown on the drawings with Traffic Paint. Width of stripe to be as indicated on the plans. Traffic paint to conform to Federal Specifications TTP-1952, such as Sherwin-Williams Company "Setfast" Waterborne Traffic Marking Paint T 266, white.

Measurement and payment for this item shall be at the contract unit price per linear foot for the following

PAVEMENT MARKINGS YIELD LINE

PAVEMENT MARKINGS 12" WIDE WHITE STRIPE

PAVEMENT MARKINGS 4" WIDE YELLOW STRIPE

PAVEMENT MARKINGS 4" WIDE WHITE STRIPE

PREFORMED PAINTED HANDICAP INSIGNIA

and shall include all necessary materials, tools, labor and layout needed to complete the work.

46. SUB GRADE PREPARATION:

Sub grade preparation shall conform to Section 301 of the Uniform Standard Specification, as modified by these Special Provisions and as directed by the Engineer.

The sub grade shall be constructed in accordance with Subsection 301.3 of the Uniform Standard Specifications except for the following densities:

(A) Major streets: 95 percent

(B) Other streets and traffic ways: 90 percent

(C) Curbs, gutters, Brick header and sidewalks: 90 percent

(D) Planting Beds and decomposed granite 85 percent

The Measurement and payment for performing this item shall be incidental to the cost of construction and will not be made with the except for providing sub grade preparation for all asphalt pavement areas which shall be made on a per square yard basis and be paid under SUBGRADE PREPARATION FOR AC PAVEMENT. Cost of which shall include providing all hauling, socketing, sub grade preparation, etc., and shall be incidental to the construction and associated unit price items except as noted otherwise for asphalt areas.

47. AGGREGATE BASE COURSE

Aggregate Base Course shall conform to the requirements of Section 702 of the Uniform Standard Specifications and shall be crushed in accordance with Subsection 702.0 of the Uniform Standard Specifications.

Measurement or payment for the Aggregate Base Course 6" for this project shall be made on square yard basis for asphalt areas, cost of which shall be full compensation for the work, complete in place, including labor, materials and equipment.

48. ASPHALTIC CONCRETE

The bituminous material to be used shall be A-25 complying with the requirements of Section 710 of the Uniform Standard Specifications.

All permanent asphalt concrete shall be dense grade, adequately compacted and installed as shown on the plans. The base course shall consist of 2 inches compacted thickness Type C-3/4 dense graded asphalt concrete. The surface course shall consist of a 1 inch compacted thickness Type D-1/2 dense graded asphalt concrete laid n one course. See plans for location All surface course paving shall be laid during daylight hours only.

An acceptable surface shall not vary more than one fourth (1/4) inch from the lower edge of a sixteen (16) foot rolling straightedge when the straightedge is place parallel to the center line of the roadway. The City shall furnish the straightedge.

The mineral aggregate shall meet the grading requirements for the Mix Designation C-3/4 and D-1/2 in accordance with Table 321-1.

The following set of asphalt mix design criteria shall be adhered to by all plants in the Phoenix Metropolitan area for use on this project.

ASPHALT MIX DESIGNS

	PERCENTAGE BY WEIGHT PASSING		
SIEVE SIZE	A-1 1/2	C-3/4	D-1/2
1-1/2	100	100	100
1	86-100	100	100
3/4	81-95	86-100	97-100
1/2	NO. SPEC.	79-92	81-95
3/8	51-65	68-82	71-75
#4	36-50	50-64	51-65
#8	30-40	38-48	40-50
#30	15-25	18-28	20-30
#200	3-7	3-7	3-7

Mineral Filler	1.5	1.5	1.5
	WEST SIDE AQUA FRIA RIVER PLANTS		
Oil Content	4.8	5.7	6.0
Oil Major Streets	4.3	5.2	5.5
	SALT RIVER PLANTS		
Oil Content	4.3	5.5	6.0
Oil Major Streets	4.3	5.0	5.1

In addition to pug mill type mixing plants, drum dryer mixers will be allowed in accordance with Subsection 710.9 of the Uniform Standard Specifications.

The moisture content of the bituminous mixture immediately behind the paver shall not exceed three (3) percent when tested in accordance with the provisions of ASTM 1461-85.

The proper proportioning of the material at the cold feed shall be determined by the contractor and approved by the Engineer prior to the production of asphaltic concrete. Production shall not commence until calibration test indicate that an acceptable product can be obtained.

The correct proportions of each aggregate size introduced into the mixer shall be drawn from the storage bins by an approved type of continuous feeder, which shall supply the correct amount of the aggregate in proportion to the bituminous material and shall be so arranged that the proportion of each size can be separately adjusted. The continuous feeder for the aggregate may be mechanically of electrically activated.

The plant shall be equipped with a sampling device to take representative composite samples of the cold feed. If tests indicate non-compliance with specifications, operation shall cease until proper corrections have been made.

The production of the plant shall be governed by the rate required to obtain a thorough and uniform mixture of the materials. Mixing shall continue until the uniformity of coating, when tested in accordance with the requirements of ASSHTO T-195, is at least 95 percent.

Payment for asphaltic concrete will be paid for at the contract unit price bid per square yard for Asphalt Concrete Surface Course, which price shall be full compensation for the work, materials, asphalt layers, and tack coat installed compacted asphalt courses complete in place, including labor material and equipment. Payment bid price will bid as the 2" THICK ASPHALTIC CONCRETE BASE and 1" THICK ASPHALTIC CONCRETE BASE complete and will include all items complete as described for the Asphalt Concrete Surface Course and Bituminous Tack Coat

BITUMINOUS TACK COAT

The tack coat shall be grade SS-lh (diluted). Tack coat shall be applied in accordance with Section 329 of the Uniform Standard Specifications.

No measurement or payment will be made for the bituminous tack coat for this project, the cost of which shall be incidental to Asphaltic Concrete items.

49. INTERSECTION TRAFFIC TABLE

Intersection traffic table shall be constructed as per plans and details illustrated by civil engineer.

Concrete shall be 8" thick AA (Modified) concrete. Concrete is to be used as per MAG section 725, minimum strength 4000 PSI at 14 days and 5000 PSI at 28 days. Contractor to use 3/8" rock for exposed aggregate concrete.

Measurement and Payment for this work shall be paid for at the contract unit bid price per lump sum for INTERSECTION TRAFFIC TABLE and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

50. CONCRETE PAVERS

Concrete pavers shall be installed as per manufacturers specifications and as per plans and details and as described in the PAVERS section of these specifications

Pavers shall be placed at traffic table location only to reflect pattern and colors indicated in the plans and details

Measurement and Payment for this work shall be paid for at the contract unit bid price per square foot for concrete pavers and shall included all subgrade preparation, materials, tools, labor, survey and layout necessary to complete the work.

51. TOP SOIL

Contractor is required to provide an adequate amount of fill material in order to modify the grades at construction site to provide for appropriate surface berms that may be required. Fill shall be free of debris, discarded construction and or landscape materials and ungerminated seed of any kind.

Payment for this item shall be full compensation for all labor, material, tools and equipment required to install, grade and compact fill to required densities and desired contour intervals as illustrated with in the construction plans of the bid set and shall be included in the cubic yard price bid for TOPSOIL FOR BERMS.

52. LANDSCAPE AND PLANTING:

Contractor will furnish and install all plant material as indicated on the Plans. Plant material will be installed complete including placement, back filling, staking, planting soil, soil preparation, 90 day maintenance and one year guarantee. Contractor will trim existing trees and shrubs to remain as directed by the Landscape Architect as an incidental cost to the plant material. Payment for plant material will be made at the contract price per each plant. Payment associated with grading in planting areas and adjustment of existing planting and soil preparation in ground cover planting areas shall be included in the unit prices per each plant.

53. LANDSCAPE BOULDERS

Boulders shall be field select granite boulders as approved by the Landscape Architect prior to delivery and installation. Payment for the boulders shall be for boulders delivered and installed complete including installation, excavation and all incidentals. Payment will be for the ton cost for LANDSCAPE BOULDERS of various sizes as indicated in the plans.

54. DECOMPOSED GRANITE AND WEED CONTROL:

Contractor will furnish and install decomposed granite as indicated on the plans, details and supplemental specifications and provide weed control as indicated on the plans and in all planting areas. The cost for weed controls shall be included in this cost Contractor shall guarantee total control and elimination of weeds for a period of one year from the time of final acceptance. Weed control application shall commence in two stages, one prior to installation of DG and one after. All applications of Surflan or approved equal shall be performed by an applicator licensed and registered with in the state of Arizona. Decomposed granite is to be 1/3 – ¼" minus, 1/3 – ½" minus and 4" – 6" rap.

Measurement and payment will be made at the contract unit price and unit quantity as shown in the Bidding schedule, which price shall be full compensation for the item, complete in place, including all necessary excavation, backfill, labor materials, weed control and equipment.

Payment for this item will be made at the contract price per cubic yard for DECOMPOSED GRANITE 1/4" MINUS.

55. IRRIGATION WATER SERVICE

Contractor shall provide all the necessary taps, labor, pipes, valves, valves covers etc. required to provide service connections for installation of new water meters and taps per City of Glendale Std. Detail G-342-A. The City of Glendale shall provide and install the water meters.

Payment for this item shall be included in the cost for 1" WATER METER SERVICE at the contract price per each and shall include all pipe, fittings, trenching, pavement replacement and connection to the water supply to provide a fully complete and operational system.

56. BACKFLOW PREVENTER WITH CAGE

Contractor shall provide and install the backflow preventers with cage and all necessary valves, piping materials and concrete fully operational per plans details and specifications.

Payment for this item will be made at the contract price per each for 1" REDUCED PRESSURE BACKFLOW PREVENTION UNIT AND CAGE fully complete and operational.

57. IRRIGATION CONTROLLER

Contractor to install irrigation controllers to match the quantity and type indicated in the construction drawings. Controllers to be installed as per manufacturers specifications and to include all necessary wiring, pedestals, pads programming and security precautions as part of the complete price.

Payment for this item shall be on an each basis for ALTEC LAIT W/SOLAR POWER-CONTROLLER and shall include, in addition to above mentioned items, all labor, materials, tools and necessary layout for the completion of the job.

58. AUTOMATIC IRRIGATION SYSTEM:

Contractor will furnish and install a new automatic irrigation system complete including but not limited to all heads, pipe, wiring, valves, covers, controls, power to power supply including installation of APS provided J-Box etc., complete and operational. Work shall include all necessary labor, pipe, heads, boxes, covers, controller cabinets concrete base, sleeves, wire, boxes, covers, materials, fertilizer injectors, service to power supply, fees etc. and adjustments to the systems for a fully operational and automatic system.

The contractor shall lower or dip all irrigation lines, sleeving and conduits at crossings with existing utility lines and services so as to maintain a minimum of one foot of separation as an incidental cost to the irrigation system work.

Contractor shall provide and install up to 10 percent of additional heads, piping, zones, wires and valves required to provide the irrigation system as fully operational with full coverage with minimum over spray of walks and paved surfaces at no additional cost to the owner.

Payment for this item shall be made at the lump sum contract price fully complete and operational for IRRIGATION SYSTEM COMPLETE.

59. SITE GRADING:

Work under this item shall include all necessary grading that is required by the project. Grading shall include but not be limited to construction of landscape berms, retention basins, sidewalk and roadway grading and any other grading operations as required by the construction plans. Any necessary fill that needs to be obtained in order to complete this item shall be considered as incidental to the unit cost. Contractor is responsible for determining the amount of cut and fill required to complete the job.

Payment for this item shall be made at the lump sum contract price for SITE GRADING AND NECESSARY FILL fully complete, including all fill, equipment, labor, survey, layout and all incidentals necessary to grade the site as illustrated in construction plans.

60. GRASS SEEDING:

Hydro seeding shall conform to MAG section 795 with the following additions and supplementary specifications:

This work shall consist of furnishing and installing all materials, labor and equipment specified and required and all other material and labor required to provide a substantial stand of grass as designated and shown in the plans and specifications within six months of project completion.

See Supplemental Landscape Specifications for addition Turf specifications.

If Bermuda summer lawn has not been established during its normal planting season, April through September, the contractor shall be required to seed the area with the Bermuda at the beginning of the following Bermuda growing season and will also seed the area with hybrid rye grass seed and establish and interim lawn for the period before the Bermuda growing season.

In flood irrigation areas, Bermuda / rye shall be drill seed or colter packed. Temporary irrigation system shall be provided, if necessary, until first mowing, cost incidental to Grass Seeding & establishment.

Payment For Grass Seeding shall include full compensation for the placement and establishment of Grass per specifications and supplementary specifications including seed, materials, watering, maintenance, labor and warranty as required for the establishment of the Grass at a per Square Feet for " TURF SEEDING".

61. STABILIZED GRANITE:

Stabilized decomposed granite shall be a factory blended moisture of decomposed granite and aggregate stabilizing agent prepared in accordance with specifications of Stabilizer, Inc. or prior approved equal. All decomposed granite material shall be in color as selected by ASU East and sized in accordance with the 1/4 inch minus aggregate gradation requirements as follows:

Sieve Size	Percent Passing
1/2″	100
1/4″	85-100
No. 4	40-85
No. 40	25-40
No. 100	5-25
No. 200	0-5

The stabilized decomposed granite mix shall be evenly distributed on the designated areas to a minimum depth of 2″.

After placing and grading lightly, water settle by thoroughly saturating aggregate layer and removing fine material from surface. After settlement, compact with water-filled roller having a minimum weight of 250 pounds, to an extent satisfactory to the Engineer. Apply a second application of pre-emergent control according to manufacturer's recommendations. Prohibit traffic until surface is dry: 24 hours minimum.

In-place Compacted Thickness: Stabilized Decomposed Granite Surfacing: With 0.05 ft. above and 0.02 ft. below specified thickness.

Surface Smoothness: Measured parallel with and at right angles to surfacing centerlines using 10 ft. straightedge: 0.02 ft. plus or minus.

Payment for this item will be made at the contract price per square foot for STABILIZED DECOMPOSED GRANITE and shall include all necessary material subgrade preparation, tools, steel edging as illustrated on the plans, labor and layout to complete the work

62. CONTROL OF WORK AND MATERIALS:

Control of work and materials shall comply respectively with Sections 105 and 106 of the MAG Specifications, expect as modified by the "Special Provisions".

63. STOCKPILE OF MATERIALS:

The Contractor may place or stockpile materials in the public right-of-way provided they do not prevent access to adjacent properties or prevent compliance with traffic regulations.

Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintaine.

SUPPLEMENTAL SPECIFICATIONS LANDSCAPING

1. GENERAL

1.1 CONDITIONS. All items of this Section are subject to all items of and all conditions set forth in the General Conditions and Special Provisions of these Specifications.

ASU East reserves the right to replace, remove and or add any plant material to the landscape plan. Contractor to contact ASU East representative for final landscape plan decisions prior to bid and construction.

1.2 WORK INCLUDED IN THIS SECTION. The Contractor shall furnish all labor, tools, equipment, products, materials and transportation; and perform all operations necessary and incidental to properly execute and complete all work in accordance with the drawings and these Specifications. The work shall include, but is not necessarily limited to, the following:

1. Backfill Soil Mixture
2. Selection and Transporting Plant Material
3. Installation, Establishment and Maintenance of Seeded Lawn
4. Planting Operations
5. Tree staking
6. Decomposed Granite
7. Maintenance and Guarantee of Plantings and Landscape Areas
8. Weed Control
9. Warranty

1.3 RELATED WORK SPECIFIED ELSEWHERE. Automatic Irrigation

1.4 QUALITY ASSURANCE.

A: Workmanship

1. All planting work shall be done in strict accordance with sound nursery practice and shall include maintenance and watering of all plant materials installed until final acceptance by the Owner.

2. Sidewalks adjacent to work areas shall be kept broom clean daily during planting operation. Plant containers, empty fertilizer bags and containers are to be picked up and disposed of daily. Contractor's trash shall be removed from the site at the completion of work each day. Any damage to the sidewalk shall be repaired or if necessary replaced after inspection by Engineer.

B: Plant Materials:

1. Trees, Shrubs and Groundcover.

A. All plant materials shall have been grown in nurseries, which have been approved by State of Arizona Department of Agriculture and shall be tagged with correct names. All plant materials shall be inspected by the Landscape Architect prior to delivery, and all plant material not meeting Specification requirements shall be rejected. Contractor shall, at his own expense, replace rejected plant material with material of species and variety that meet Specification requirements.

B. Plants shall be quality material having the habit and growth which is normal for the species; sound, vigorous, healthy, free from insects, plant diseases and injury.

1.5 SUBMITTALS. Samples:

1. Submit duplicate samples and manufacturer's guaranteed analysis of the following items and such other materials as may be required by the Landscape Architect, and obtain written approval thereof before beginning fabrication or delivery of material to the project site. Finished work shall match approved samples.

a. Tree ties and stakes

b. Fertilizers: 1/2 pound each with noted analysis

c. Topsoil

d. 3/4" minus Spanish Gold Decomposed granite

e. Plant Material

PLANT GUARANTEE AND REPLACEMENT:

1. Prior to final acceptance the Contractor shall submit to the Engineer or Landscape Architect a written guarantee for all plant material for a period of one year. The guarantee shall stipulate the following:

   a. All trees, shrubs, and ground cover shall be guaranteed to take root and grow and thrive through the one-year guarantee period, after acceptance by Landscape Architect. The guarantee period for deciduous trees shall be in effect for a period on one year and until all are showing new growth, the spring following the end of the warranty period.

   b. Any plant materials that die back and lose the form and size originally specified shall be replaced, even though they have taken root and are growing after the dieback.

   c. At any time during construction, during the maintenance period, or at the end of the guarantee period, any plant required under this specification which is dead or otherwise not acceptable and not in a satisfactory growing condition in the opinion of the Landscape Architect, shall be removed from the site and replaced with a suitable plant as specified within fifteen (15) days.

   d. Replacements shall be made to same specifications required for original materials and shall carry the same guarantee from the time they are replaced.

INSPECTION AND ANALYSIS CERTIFICATES:

1. Submit the following to the Landscape Architect for approval, prior to or upon delivery, of the materials to the site:

   a. Plant material inspection certificates required by State and Federal laws with respect to inspection for plant disease and insect infestation shall accompany each shipment of plant materials.

   b. Contractor shall deliver the above and all other certificates to the Landscape Architect.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING.

Manufactured materials shall be delivered in original containers with brand and manufacturer's name marked there on. Materials in broken containers or showing evidence of damage will be rejected and must immediately be removed from the site. Odorous materials shall not be brought to the site until they are to be used.

Store fertilizers and all other moisture sensitive materials in a dry place and protect from intrusion of moisture.

PLANT MATERIAL:

1. Protect plant material at all times during handling, shipping, storage and planting from extreme weather conditions, wind, drying roots and root balls and injury.
2. Support root systems of container plant material when lifting and moving to minimize injury to root ball.
3. Plant material showing damage from shipping, while in storage or during planting may be rejected by the Landscape Architect. Rejected plant material shall be removed and replaced by the Contractor at his own expense.

1.07 SITE CONDITIONS.

All planting procedures and other site work shall not be performed during wet or muddy conditions.

All existing plant material not indicated for removal shall be protected as necessary to ensure survival.

1.08 INSPECTIONS.

A written notice or phone call requesting an inspection shall be given the Engineer or Landscape Architect a minimum of 48 hours prior to each anticipated inspection date.

Progress Inspections: The following inspections will be required.

1.Tillage and soil preparation of all planting areas.

2. Finish grading.

3. Inspection and approval of all plant materials upon delivery to the site. The plant material shall be assembled for this inspection.

4. Inspection and approval of trees and shrubs at site after being spotted by Contractor.

5. Inspection of irrigation system before backfilling trenches.

6. Inspection for both applications of pre-emergent herbicide before and after placement of decomposed granite.

FINAL PLANTING INSPECTION FOR ACCEPTANCE:

1. Final inspection of trees and shrubs shall be made at the conclusion of the project, provided that on such date all other project improvements and corrective work has been completed.
2. Prior to the time of final inspection, the following work shall have been completed:

   a. All weeds shall be sprayed with systemic herbicide and removed from all planted areas.

   b. All errant trash and debris shall be removed from all planted areas.

   c. All components of irrigation system shall be operable and in proper working order.

   d. All work put in a neat, orderly condition.

2. PRODUCTS

2.1 GENERAL.

QUALITY:

1. Generally, these Specifications define minimum acceptable quality. Materials installed shall be as listed in this section on the drawings by manufacturer's name and model number or by description of attributes, performance of other standards.

SUBSTITUTIONS:

1. No material substitutions will be accepted unless request is submitted in writing to the Engineer or Landscape Architect for approval prior to commencing work on this Section. Any substitute material installed without prior approval may be rejected by the Engineer or Landscape Architect, and if rejected shall be removed and replaced to the satisfaction of the Engineer or Landscape Architect at no additional cost to the Owner.
2. The Contractor shall submit to the Landscape Architect proof that a specified plant is not reasonably available in the local region before a request for plant substitution will be considered.

2.1 MATERIALS.

PLANT MATERIAL:

1. The Contractor shall furnish and plant all plants shown on the drawing and as specified.
2. All plants shall be healthy, shapely, and well rooted.
3. Genus, species, and variety; quantity, size and condition as indicated on the drawings and plant material listing. No substitutions without prior written approval of Landscape Architect.

4. Plant material shall be healthy nursery stock, full foliage when in leaf; free from disease, injury, insects, all weeds, and weed roots.
5. Plants shall be in accordance with the Arizona Nursery Association Standards in all ways (see Arizona Standard for Nursery Stock sponsored by Arizona Nursery Association, current edition).
6. Cold storage plants are not acceptable.
7. Potted and container stock well rooted, vigorous enough to ensure survival and healthy growth.
8. Container plants, one gallon size and larger shall have grown therein a minimum of six months and a maximum of two years, with roots filling the container but not showing evidence of being or having been restricted, deformed or root bound.
9. Trees: Untapped, straight, single leader trees except for multiple stem (clump) trees. Deciduous trees with heavier than normal top and balanced branching.
10. Plant material shall be free from disfiguring knots, sunscald injuries, bark abrasion, evidence of improper pruning, and other objectionable disfigurements.
11. Trees shall have well-developed branch systems.
12. Thin, weak and leggy plants will be rejected by the Landscape Architect.
13. All plant material shall be legibly tagged by species and variety with minimum of one tag per 10 trees.
14. Plant material not meeting these requirements shall be removed from the site and replaced to the satisfaction of the Landscape Architect.
15. All plants shall conform to the measurements specified in the plant list. Exception are as follows: Plants larger than specified in the plant list may be used if approved by the Landscape Architect, but use of such plants shall not increase the contract price. If the use of the larger plants is approved, the spread of root or ball of earth shall be increased in proportion to the size of the plant.

Fertilizers: in conformance with the State Agricultural Code.

1. Dry chemical fertilizer: 16-20-0 (N-P-K).
2. Controlled slow release tablets: Agriform 21 gram tablets with a 20-10-5 analysis (N-P-K)

Pre-Emergence Control Herbicide:

1. Surflan
2. Dacthal - DCPA W-75

Decomposed Granite 3/4" Minus Spanish Gold.

Topsoil: High quality as approved by Landscape Architect.

Miscellaneous Materials.

1. Tree Stakes:
   a. Lodge pole pine stakes with copper napthenate, 2-inch diameter by 10' long minimum actual dimension, of uniform size and pointed at one end.
   b. All trees shall be double staked
2. Ties: 10- gauge, rubber-coated galvanized steel wire through 1/2" rubber hose, length required by tree staking on site. Double hose at each tie.

3. EXECUTION

3.1 INSPECTIONS OF SITE CONDITIONS

1. Examine site for conditions that will adversely effect execution, permanence, quality of work and

survival of plant material. Advise Landscape Architect of any concerns.

2. Begin work on this section only after conditions are acceptable.

3.2 SITE PREPARATION.

Clearing, Grubbing and Soil Loosening:

1. All planting areas shall be cleared of all existing plant material, brush, weeds, debris and rocks over 1 inch in size prior to any soil preparation. Noxious brush weeds and grasses shall be removed by the roots wherever they are found at any stage of the work.

2. After clearing and grubbing has been completed, the existing surface shall be scarified and cultivated to a minimum depth of 8 inches; then brought to finish grade. During the operation, debris, including all stones over 1 inch in any dimension shall be removed and disposed of offsite.

After clearing and grubbing and initial cultivation has been completed, chemical fertilizer, 16-20-0 composition, shall be mechanically spread over the entire area at an average rate of 10 pounds per 1000 square feet. After spreading the fertilizer shall be cultivated into the top six inches of soil using suitable equipment. The resulting soil shall be in a friable condition, suitable for planting.

And additional 10 pounds of 21-0-0 and 10 pounds of Soil Sulfur per 1000 SF shall be applied to the turf areas.

3.3 PLANTING OPERATIONS.

A. Soil Preparation:

1. No finish grading or topsoil distribution shall be done until soil loosening has been approved by the Landscape Architect.

2. Stockpiled topsoil shall be evenly distributed over all excavated areas to be planted.

3. Place topsoil and bring to a smooth, even grade. Soil shall be thoroughly water settled and high and low areas regraded in accordance with the paragraph entitled "Finish Grading," Item 3.03

B. Soil Rototilling: Ground Cover Planting Areas

1. After topsoil installation has been completed and approved by the Landscape Architect, rototill in tow directions (perpendicular to each other) into the top 6 inches of soil.

a. The resulting soil shall be in a loose friable condition.

C. Backfill Mixture:

1. Ingredients:

a. 1/4 Nitrolized mulch

b. 3/4 native soil

2. Mixed thoroughly, leaving no layers of soil amendments or clods of soil.

3. Obtain Landscape Architect's approval prior to backfilling.

4. See details and notes on plans for further clarifications.

D. Soil Mix for Planters: Same as backfill mixture above.

FINISH GRADING:

1. Grades not otherwise indicated shall be uniform levels or slopes between points where elevations are given, or between points established by walks, paving, curbs or catch basins. Finish grades shall be smooth, even and on a uniform plane with no abrupt changes of surface. Minor adjustments of finished grades shall be made at the direction of the Engineer or Landscape Architect, if required.

2. All grades shall provide for natural runoff of water without low spots or pockets. Flow line grades shall be accurately set and shall not be less than 2 percent gradient where possible.

3. Tops and toes of all slopes shall be rounded to produce a gradual and natural appearing transition between relatively level areas and slopes.

4. Top 6 inches shall be free of rocks or other inert materials over 1/2 inch at greatest dimension.

5. All planting areas shall be free of road base, road materials and gravel. All road materials and gravel shall be removed and replaced with approved topsoil.

Planting Holes:

1. Locate planting holes per planting plans bringing any conflict with underground utility to the attention of the Engineer or Landscape Architect. All plants are to be spotted on the site and locations approved by the Landscape Architect before planting.
2. Planting holes shall be excavated with vertical sides and flat bottoms to the size indicated on the plans.
3. Do not install plant material until all construction work has been completed and irrigation system has been installed and tested. Planting areas shall have been graded and prepared as specified and shall have been approved by the Landscape Architect.
4. Do not plant during unfavorable weather. Soil shall be at an optimum moisture content or planting. Do not plant in dry soil or muddy soil.

Container Plant:

1. Place tablets (Agriform 21 gram with A 20-10-5 analysis) in the backfilled planting holes 8 inches below finish grade at the following rate:

   1 gallon container — 1 tablet

   5 gallon container — 2 tablets

   15 gallon container — 4 tablets

   24 gallon container — 6 tablets

   a. Do not lift or handle container plants by tops, stems or trunks at any time.

   b. Fill bottom of planting hole with backfill mix and compact.

   c. Plants shall be set in center of hole plumb and straight and at such an elevation that after settlement the root crown of the plant will be 1-1/2 inch higher than surrounding finish grade.

   d. Backfilling

      1. Backfill the planting hole with the topsoil herein specified.

      2. Water settle backfill thoroughly, or compact by other method approved prior to planting, so plants do not settle.

   e. Fertilizing Tablets: Agriform 21gram tablets

   f. Immediately after planting hole is backfilled, a shallow reservoir slightly larger than the planting hole and 4 inches deep shall be formed.

   g. Watering - immediately after planting water each tree and shrub by filling reservoir twice.

5. Pruning: Trees and shrubs shall be pruned as directed by the Landscape Architect throughout the maintenance period.
6. Planting Areas: All planting areas shall be free of gravel or road material. All material found shall be removed by contractor and replaced with approved topsoil as incidental to the cost of plant material installation.

Weed control:

1. Licensed pest control operator shall apply pre-emergent herbicide to all planting areas before and after placement of decomposed granite, in accordance with the manufacturer's recommended rates. Any plant materials showing loss of vigor or health due to improper application of herbicide shall be replaced by the Contractor. **The Landscape Architect shall witness both applications of pre-emergent herbicide.**

Tree staking shall be done immediately after planting.

a. Double stake all trees.

b. Set stakes plumb

c. Two ties per tree; double rubber hose at each tie.

d. Set up sample stakes and ties and obtain the Landscape Architect's approval thereof prior to installing tree stakes and ties.

Pruning: Trees and shrubs shall be pruned as directed by the Landscape Architect throughout the maintenance period.

Ground Cover:

1. All ground cover areas shall be treated with a pre-emergent herbicide as called out in granite areas.
2. All ground cover planting shall be immediately watered to avoid drying out until the entire planted area is completed.
3. All areas, which include one-gallon ground covers, shall receive the Soil Rototilling and soil backfill mixture.

Decomposed Granite/Weed Control:

1. Prior to placing granite, the area shall be totally free of weeds, using chemical control as necessary. Apply a pre-emergent herbicide according to manufacturer's recommendations. The decomposed granite shall be evenly distributed in the designated areas and compacted to a minimum two-inch depth. A second application of pre-emergent herbicide shall be applied at this time.
2. Decomposed granite shall be as described in the bid spec and the landscape plans, color to be determined by ASU East. Decomposed Granite to be approved by the Landscape Architect and be free from lumps of balls of clay, and not contain calcarious coatings, caliche, organic matter of deleterious substances. All material shall be free from a single production source and shall present a uniform appearance. Material containing clumps, which will not disintegrate with a shovel, shall be rejected.
3. Areas of existing decomposed granite disturbed by new construction are to be replenished with new decomposed granite with matching color and size, evenly distributed with existing decomposed granite, sprayed with an application of pre-emergent herbicide, at no additional cost to owner. Color and size to be approved by landscape architect.
4. Decomposed granite shall be compacted to a minimum of two-inch depth using a minimum 3-ton vibratory roller and a vibratory plate in accessible areas due to plant material location.

Bermuda Grass Lawn:

A. If Bermuda summer lawn has not been established during its normal planting season, April through September, the contractor shall be required to seed the area with the Bermuda at the beginning of the following Bermuda growing season and will also seed the area with hybrid rye grass seed and establish and interim lawn for the period before the Bermuda growing season. The rate seeding shall be 4 pounds of Common Bermuda seed per 1000 square feet or the following of the" hybrid" rye mix of 15 pounds of rye seed per 1000 square feet

B. Seed purity shall be 98% purity and 90% germination.

C. The Contractor shall reseed the lawn with the specified Bermuda seed at the end of the winter lawn growing season if the annual rye seed was utilized.

D. After seeding has been completed, the entire area shall be rolled with a lawn roller for the leveling and seed retention. Immediately after rolling, the area shall be watered with a mist type spray until the soil is wet to a depth of 2 inches.

E. The Contractor shall provide the necessary safeguards to protect the planted areas from damage by erosion or trespass. Any damaged areas or any areas, greater than 6 inches in diameter, which fail to show a good stand shall be repaired and replanted until an acceptable stand of grass is obtained.

3.4 CLEAN-UP.

Keep project site free from accumulation of debris resulting from work specified herein. Broom clean pavement daily. Remove weed fiber, fertilizers, etc., from walls, pavement and curbs. Project site shall be kept neat at all times.

A. Upon completion of planting operation, all remaining soil, stones and other debris shall be removed from site and disposed of in a manner satisfactory to the Landscape Architect.

B. Upon completion of work, all trees and shrubs shall have been pruned and injuries repaired. Limit amount of pruning to the minimum necessary to remove dead or injured twigs of branches and to compensate for loss of roots as a result of planting and construction operations.

4. MAINTENANCE

4.1 MAINTENANCE PERIOD.

Contractor shall maintain all landscaped areas on a continuous basis as they are completed during the course of work and continue maintenance for a period of 90 days from the time of acceptance.

Maintenance shall include, but is not limited to, the following:

1. All watering, fertilizing, cultivation and spraying necessary to keep the plant material in a healthy growing condition and to keep the landscaped area weed free. Pruning and re-staking of plants shall be at the direction of the Landscape Architect. All plants shall be watered at the time of planting and thereafter as necessary to maintain healthy plants.
2. All errant trash and debris shall be removed from the site on a continuous basis or as necessary.
3. Replace any dead or dying plant material as directed by the Landscape Architect.

Maintenance period for grass shall be 180 days.

4.2 PLANT ESTABLISHMENT PERIOD.

Period: 90 calendar day period commencing on date stated on Landscape Architect's field notification after his inspection and approval. Inspection shall be conducted upon request from contractor upon substantial completion of planting and related work.

During plant establishment period the Contractor is responsible for maintaining all planted areas as stated in item 4.01 until final acceptance by the owner.

4.3 PLANT WARRANTY.

Contractor shall provide full warranty for all plant material for a period of one year from the time of final acceptance. All replacement plant material shall have warranty for a period of one year from the time of replacement.

SUPPLEMENTAL SPECIFICATIONS IRRIGATION SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Furnish and install Sprinkler System Work as shown on Drawings and as specified herein.

B. The Work consists of installing a complete underground sprinkler, emitter and bubbler system for all turf and landscaped areas as shown on the Drawings and as hereinafter specified, including the furnishing of all labor, equipment, appliances, and materials including water and in performing all operation in connection with the construction of the irrigation system. Work shall include furnishing and installing all plastic and copper pipe and fittings, automatic control valves, valve access boxes, electric computerized central controllers, electric wire, telephone access line (if required), etc., as required for a complete system as shown on the Drawings and as called for in these Specifications or as may be required for proper operation of the system. The Contractor is responsible for all costs of water used in connection with the installation of the irrigation system.

C. Whenever any material is specified by name and/or number thereof, such Specifications shall be deemed to be used for the purpose of facilitating a description of the materials and establishing quality, and shall be deemed and construed to be followed by the words "or approved equal." No substitutions will be permitted which have not been submitted for approval prior to bidding.

D. All materials shall be new and of the highest standard and class. Sufficient descriptive literature and samples must be furnished for any materials submitted for "approved equal".

E. Irrigation lines shown on the drawings are essentially diagrammatic. Actual locations of all heads, valves, piping, wiring, etc., shall be established by the Contractor at the time of construction with the approval of the City Inspector or his representative (if required).

F. Unless otherwise specified or indicated on the Drawings, the construction of the irrigation system shall include the furnishing, installing and testing of all mains, laterals, risers, and fittings, the furnishing and installing of irrigation heads, control valves, controllers, low and high voltage electric wire, telephone access line to central control unit (if required), point of connection, controls, restoration of existing improvements, excavation and backfill, and all other work in accordance with the Plans and Specifications as required for a complete system.

G. Verify questions on scope of work prior to submitting a bid.

H. ASU East reserves the right to substitute any and all irrigation components depending on their availability to the University. Irrigation requirements may change due to component substitutions and or plant numbers. Contractor to verify final irrigation and planting design with ASU East Representative,

1.2 REFERENCES

A. Comply with requirements of Uniform Plumbing Code.

1.3 SYSTEM DESCRIPTION

A. System Design Requirements:

1. Design pressures: As indicated on Drawings from irrigation meters and at last head in circuit.
2. Location of heads: Design location is approximate. Make minor adjustments as necessary to avoid plantings and other obstructions.

B. Minimum Water Coverage (100% expected):

1. Turf areas: 95%.
2. Other planting areas: 85%.
3. Layout may be modified, if necessary to obtain coverage, to suit manufacturer's standard heads. Do not decrease number of heads indicated unless otherwise acceptable to Architect/Engineer. If

modified, provide shop drawing showing changes that were necessary and present to Architect/ Engineer.

1.4 SUBMITTALS

A. General: Submittals.

B. Product Data: Submit manufacturer's technical data and installation instructions for underground sprinkler system. Submittal shall include technical data on specific equipment installed as follows:

1. Backflow prevention unit
2. Isolation valves
3. Electric gate valves
4. Pressure reducers
5. Wye filters
6. Controllers
7. Turf sprays/rotors (if applicable)
8. Drip emitters (if applicable)
9. Distribution tubing
10. Copper and PVC tubing and fittings
11. Control wire and wire connectors
12. PVC flue and primer
13. Component/valve boxes
14. Any other miscellaneous irrigation equipment used.

C. "As-Built" Drawings: Submit shop drawings for landscape irrigation system including plan layout and details illustrating location and type of heads, valves, piping circuits, controls and accessories.

D. Contract Closeout Submittals: Submit the following in accordance with Section 01780, Contract Closeout.

1. Project Record Documents: Maintain record Drawings showing exact locations of mains, branches and valves installed. On completion and acceptance of Work, supply two prints to Architect.

E. Prepare "as-built" Drawings on blueprints which show deviations from the bid Documents made during construction which affect mainline pipe, controller locations, remote control valves, quick coupling valves, phone line routing, and all sprinkler heads. Drawings shall indicate size, material, and manufacturer's name and catalog number. Drawings shall be delivered to the Owner before final acceptance of Work.

F. Provide the Owner with the following, in addition to what is shown on the Drawings:

1. Manufacturer's operating and maintenance instructions.
2. Project record Drawings of the system.
3. Schedule showing the length of time each valve is to be open to produce a given amount of precipitation per season.
4. Six extra sprinkler heads of each size and type.
5. Two valve keys for manual valves.
6. Wrench for each type head core.
7. Wrench for removing and installing each type head.
8. A permanent identification of valve stations and areas irrigated on the 8-1/2" x 11" chart to be placed on the inside door to the appropriate controller. The chart shall be plasticized and sealed for permanency. Xerox reduction of print, sealed in plastic will be acceptable.
9. Two valve keys for mainline gate valves when mainline gate valves are required per plans.

1.5 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shut-off with Architect/Engineer during installation of irrigation system, if necessary.

B. Review installation procedures under other sections and coordinate the installation of items that must be installed with the irrigation system.

C. Contractor is not to begin this section until the landscape grading is complete and he has called for and obtained 'Blue Stake' information.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Automatic Equipment shall be as manufactured by companies listed within the irrigation plans or by approved equal.

2.2 GENERAL

A. Unless otherwise specified or shown on the Drawings, the construction of sprinkler lines and installation of control wiring shall include excavation and backfill, the furnishings, installing and testing of sprinkler pipe and fittings, and the removal and/or restoration of existing improvements and all other work in accordance with the Plans and Specifications.

2.3 PIPE

A. Plastic pipe below ground shall be rigid unplasticized PVC - Type I, 1120-1120 extruded from virgin parent material of the type specified on the drawings. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious materials, wrinkles, and dents. Plastic pipe shall be as manufactured by Certain Teed, Johns-Mansville, Pacific Western, A.S.C., or approved equal.

B. Pipe: All PVC pipe 4" and larger shall be Class 200 rubber - ring type with Ductile Iron fittings and thrust blocked per MAG S.D. 380.

C. Contractor shall make provisions for storing all irrigation PVC pipe out of sunlight throughout the installation period of the irrigation system.

D. All pipe shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, size, schedule, and type of pipe, working pressure at 73 degrees F. and National Sanitation Foundation approval (N.S.F.).

E. Plastic pipe shall be delivered to the site in unbroken bundles or rolls, packaged in such a manner as to provide adequate protection for the pipe ends, either threaded or plain.

F. PVC below ground, type "K" hard copper above. ANSI B16.22 wrought copper or cast brass, recessed solder joint type fittings. For assembly of backflow preventer.

2.4 FITTINGS

A. Manufacturer's standard, of type and size necessary to construct automatic irrigation system as shown on Plans. General fittings specs shall be as follows:

1. PVC plastic socket type, Schedule 40, ASTM D2466, typical.
2. PVC plastic threaded and socket type where detailed, Schedule 40, ASTM D2467.
3. Ring type applications, IPS Ductile Iron, grade 65-45-12, ASTM A536 & ASTM F477.
4. Copper, wrought copper or cast brass, recessed solder joint, ANSI B16.22.

2.5 REDUCED PRESSURE BACKFLOW PREVENTER

A. The backflow preventer shall be of the reduced pressure type provided with full flow resilient seated ball valve, (2) shut-off valves and test cocks for testing unit to insure proper operation.

B. The backflow preventer body shall be of bronze construction and corrosion resistant internal components. Manufacturer's standard, of type and size to suit sprinkler system, as shown on drawings.

C. Include bronze filter, union downstream and brass test port plugs.

D. If required, install backflow preventer in expanded metal enclosure as per governing municipalities codes, guidelines and requirements. Wrap riser through concrete if applicable.

2.6 BACKFLOW PREVENTER ENCLOSURE

A. Enclosure LeMour BF Dual Swing Hinge (paint to match) or approved equal, if required. Contractor to verify that necessary enclosure meets governing municipalities codes, guidelines, and requirements.

2.7 ISOLATION VALVES

A. Manufacturer's standard, of type and size indicated on plans. Furnish 2 valve keys, 3 feet long with tee handles and key end to fit gate valves.

B. Unless otherwise specified, the installation of all valves shall include the excavation and backfill, the furnishing, installing and testing of risers, nipples, fittings, valves, and valve boxes, and the removal and/or restoration of existing improvements and all other Work in accordance with the Plans and Specifications and as required for the completed installation.

2.8 AUTOMATIC CONTROLLER

A. Automatic controllers shall be installed where indicated on the Drawings and shall be manufacturer's standard as specified on the plan, or approved equal.

B. Exterior Control Enclosure: Manufacturer's standard weatherproof enclosure with locking cover.

2.9 AUTOMATIC REMOTE CONTROL VALVES, ELECTRIC SOLENOID TYPE

A. Automatic remote control valves to be installed where shown on the Drawings and shall be slow acting diaphragm type electric solenoid operated valves of sizes as indicated on the drawings, or approved equal.

B. Valves shall be installed one assembly per valve box unless approved by Owner/Landscape Architect. Assemblies may include valve, "y" filter, and pressure regulator support appurtenances at detailed on the project plans.

2.10 FILTER & PRESSURE REGULATOR

A. Filter shall be installed where indicated on the Drawings and shall be manufacturer's standard as specified on the Plan, or approved equal.

B. The Work under this item consists of furnishing and installing the assembly complete, including valve box, pressure regulator, WYE-Strainer and other appurtenance as detailed on the project plans, at the locations shown and in accordance with these special provisions.

2.11 SPRINKLER HEADS (IF APPLICABLE)

A. The Work under this item consists of furnishing and installing the sprinkler heads in all turf areas as detailed and shown on the Plans. Sprinkler heads shall be manufacturer's standard unit, to suit sprinkler system, as shown on the Plans. If necessary, layout shall be adjusted in the field to provide uniform coverage over entire area of spray shown on the Drawings at the available water pressure.

2.12 EMITTERS (IF APPLICABLE)

A. The Work under this item consists of furnishing and installing the emitter assemblies, single outlet, and multi outlet, at the locations designated and in accordance with the details shown on the project Plans and shall be manufacturer's standard as specified on the Plan, or approved equal.

2.13 BUBBLER HEADS (IF APPLICABLE)

A. Unless otherwise specified or designated on the Drawings, the installation of bubbler heads shall include the excavation and backfill, the furnishing, installing and testing of risers, fittings, and bubbler heads, and the removal and/or restoration of existing systems, improvements and all Work in accordance with the Plans and Specifications. All bubbler heads and quick-coupling valves shall be set perpendicular to finished grades unless otherwise designated on the Drawings, or otherwise specified.

2.14 RISERS

A. All sprinkler heads and quick-coupling valves shall have an adjustable riser assembly (double swing joint riser) assembled by the use of at least three (3) Marlex street ells or PVC tees as recommended by the sprinkler manufacturer and/or as shown on the drawings. These double swing joint risers shall be of schedule 80 PVC plastic pipe and unless otherwise indicated, as shown on the Plans. The horizontal nipple connected directly into the side outlet of the main line shall be a minimum of 6" long.

2.15 QUICK-COUPLER VALVES

A. Cast bronze two piece bodies with swing joint riser, actuator key, swivel ell and plastic cover imprinted "Do Not Drink" in English and Spanish.

B. If using reclaimed water, cap of quick-coupler devices shall be purple to denote non-potable water supply.

C. Quick-coupling valve locations shown on the Drawings are essentially diagrammatic. It shall be the Contractor's responsibility to establish the location of all quick-coupling valves as directed by Owner/Landscape Architect. In no case shall spacing of quick-coupling valves exceed distances shown on the Drawings and/or those specified. The final grade shall be completed and shall have been approved by the Owner/Landscape Architect before the Irrigation Contractor starts the irrigation layout.

2.16 CONTROL CABLE

A. All electrical control and common wire shall be irrigation control cable. Wiring used for connecting the automatic remote control valve to the automatic controller shall be Type "UF" 600 volt, solid copper, single conductor wire with PVC insulation and bear UL approval for direct underground burial feeder cable.

B. Insulation shall be a minimum 4/64" thick covering of ICC-100 compound for positive waterproofing protection. Each controller shall have its own common wire to respective valves.

C. Contractor verification of wire types and installation procedures shall be checked to make sure they conform to local codes. Where more than one wire is placed in a trench, the wiring shall be taped together at 10 foot intervals. All wiring is to be sleeved under paving and structures with a separate sleeve from any other utility or piping.

D. All control wire shall follow the below color designations.

Controller	Control Wire	Common Wire	Spare Wire
A	Red	White	Yellow
B	Purple	White	Yellow
C	Orange	White	Yellow
D	Green	White	Yellow
E	Blue	White	Yellow
F	Pink	White	Yellow

All common wire shall be white.

Under no circumstances may black wire be used.

E. Pull an additional spare wire to each valve location. The color of this extra wire shall be yellow in all cases unless approved otherwise by the Architect.

PART 3 INSTALLATION

3.1 GENERAL

A. The Contractor shall lay out the system using stakes or paint to indicate the location of the various components as well as the location of each run of pipe and phone line. Preliminary adjustments to conform to actual site conditions shall be accomplished at this time.

B. Work shall be in accordance with the manufacturer's recommendations and shall be to the best standards of the industry. Spray back on buildings shall not be permitted. General arrangement and locations of piping, valves and equipment is shown on Drawings. Make minor changes required by unforeseen conflict and Work of other trades. Connect to water source described in Drawings adapting as required.

3.2 TRENCHING

A. General: Excavate straight and true. In areas subject to freezing bottom must slope uniformly to low points. Protect existing lawns and plantings. Remove and replant as necessary to complete installation. Replace damaged lawn areas and plants with new to match existing. Notify Architect prior to cutting roots 1-1/2″ or larger.

B. Trench Depth: Excavate to provide minimum cover and required pipe bedding.

C. Minimum Cover:

1. Backflow Preventer Assembly	24″
2. Mainline Beyond Backflow	18″
3. Laterals	12″
4. Under Vehicle Ways	30″
5. Control Wire	18″

D. Bedding: Bed pipe in 4″ minimum of loose friable soil, free of rocks and deleterious material.

E. Backfill: Backfill with clean material from excavation. Remove organic material as well as rock and debris larger than 1″ diameter. Place and compact material in 6″ lifts, to 85% density planted areas or 90% elsewhere.

F. Reseed and restore to original condition any areas not in healthy condition which may have been damaged from installation of irrigation system.

G. Pavements: Where existing pavements must be cut to install landscape irrigation system, cut smoothly to straight lines 6″ wider than trench. Avoid if at all possible. Excavate to required depth. Repair or replace pavement cuts with equivalent materials and finishes.

H. Jacking: At existing obstacles and walkways, jack pipe sleeves under paving material if possible, backfill and compact all voids.

I. Bore: Fire lanes shall not be cut in any manner. Dry bore and jack sleeve to provide 24″ minimum cover. Sleeve with Schedule 40 or stronger black steel pipe, as per Plans for irrigation pipe and wire. Notify Architect of voids or uncompacted material encountered.

J. Sleeves: The General Contractor shall sleeve as per schedule at walkways, walls and obstructions. Provide 2″ minimum wire sleeves as needed. Field verify any existing sleeves shown on Plans.

K. Drain Pockets: Excavate to sizes indicated. Backfill with acceptable drain material to 12″ below grade. Cover drain material with a sheet of 30 lb. asphalt saturated felt and backfill remainder with excavated material. Restore plantings disturbed by this Work.

L. Alignment of pipe shall be for a simple layout with pipe running parallel or perpendicular to features such as curbs and sidewalks as may be possible with on-site conditions and to avoid future conflict with the plant root balls.

3.3 INSTALLATION OF PLASTIC PIPE AND FITTINGS

A. Plastic pipe shall be installed in a manner so as to provide for expansion and construction as recommended by the manufacturer. Maximum of two laterals per trench. Allow a minimum of 16" between all trenches.

B. Plastic pipe shall be cut with a hand saw or hack saw with the assistance of squared-in sawing vise, or in a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that smooth unobstructed flow will be obtained.

C. All plastic to plastic joints shall be made using Weld-On P-70 primer and Weld-On 711 solvent as recommended by the pipe manufacturer. Plastic to metal joints shall be made with plastic male adapter to PVC schedule nipples. The solvent-weld joints shall be made in the following manner:

1. Thoroughly clean the mating pipe and fitting with a clean dry cloth.
2. Apply a uniform coat of primer to both the pipe and fitting. While primer is still wet, apply a uniform coat of solvent to the outside of the pipe with a non-synthetic bristle brush.
3. Apply solvent to the inside of the fitting in a similar manner.
4. Re-apply a light coat of solvent to the pipe and quickly insert it into the fitting.
5. Give the pipe or fitting a quarter turn to ensure even distribution of the solvent and make sure the pipe is inserted into the full depth of the fitting socket.
6. Hold in position for 15 seconds.
7. Wipe off excess solvent that appears at the outer shoulder of the fittings.
8. Care should be taken so as not to use an excess amount of solvent, thereby causing a burr or obstruction to form on the inside of the pipe.

D. Lay pipe on solid subbase, uniformly sloped without humps or depressions.

1. For circuit piping, slope to drain valve at least 1/2" per 10 foot run.
2. All wall penetrations, pack the opening around pipe with non-shrink grout. At exterior face, leave a perimeter slope approximately 1/2" wide by 3/4" deep. Fill this slot with backer road and an acceptable elastomeric sealant. Repair below grade waterproofing disturbed by this work and make penetration watertight.
3. Contractor to ensure the installation of all sleeves necessary to route irrigation piping and electrical control wire.
4. Install PVC pipe in dry weather when temperature is above 40 degrees F before testing, unless otherwise recommended by manufacturer.

E. Threaded male adapters shall be compounded as per manufacturers recommendation. Adapter shall then be hand tightened, plus one turn with a strap wrench. 4" main line pipe shall be "Ring tite" with bolt-type fittings. Concrete thrust block all mainline fittings, behind fittings. No concrete on any inserted PVC joints.

F. Piping under paved or concrete areas shall be sleeved in schedule 40 PVC pipe as shown on the Drawings. Where any cutting of A.C. pavement, sidewalks and/or concrete work is necessary, it shall be removed and replaced by the Contractor. Permission to cut roadway, sidewalks and/or concrete shall be obtained from the City Inspector or other governing official.

G. All pipe shall be thoroughly embedded 6" all around in construction grade sand or screened material. All lateral pipe in rocky soils shall be thoroughly embedded in sand or approved topsoil.

H. All main line pipe shall be identified with 3" wide metallic marking tape for future locating of lines.

I. All pipe lines shall have a minimum clearance of 6" from each other and 12" from lines of other trades. Parallel lines shall not be installed directly over one another.

J. Pipe sizes on Drawings are minimum allowable. Increase in size if required by Code and wherever necessary to meet unusual conditions.

K. Run lines parallel or perpendicular to buildings, walks, etc. and in straight lines as much as possible.

L. In general, the sprinkler system shall be constructed to provide 100% water coverage for those portions of the site to receive landscape material. Work shall be in accordance with the manufacturer's recommendations and shall be to the best standards of the industry. Spray back on buildings shall not be permitted.

M. Dielectric Protection: Use dielectric fittings at connection where pipes of dissimilar metal are joined.

3.4 INSTALLATION OF EQUIPMENT

A. Backflow Preventer: Provide union on downstream side. Install minimum 12″ above grade. Maximum, height 16″. Enclose in metal enclosure if required.

B. Controllers shall be installed as shown on the Plans. All wiring shall be in conformance with applicable codes.

C. Solenoid valves shall be installed and wired as shown on the Plans. Waterproof connectors shall be installed as per manufacturer's directions. All wiring shall be in conformance with applicable codes.

D. Pressure regulators, filters, emitters, turf sprays, turf rotors, and all other detailed equipment shall be installed as shown on the Drawings.

E. Install anti-drain valves as needed to prevent drainage of lateral lines into parking areas and causing standing water.

F. Flush circuit lines with full head of water and install sprinkler heads after hydrostatic test is completed.

1. Install lawn heads at manufacturer's recommended heights.
2. Install shrubbery heads at heights indicated on Drawings.
3. Locate part-circle heads to maintain a minimum distance of 4″ from walls and 2″ from other boundaries, unless otherwise indicated.

3.5 INSTALLATION OF IRRIGATION HEADS AND RISERS

A. Heights of irrigation heads in relation to ground level shall be as shown on the Plans and in the details.

B. Irrigation heads and riser assemblies shall be installed as shown on the Plans.

C. Irrigation heads shall not be assembled to risers until flushing is completed. Care shall be taken prior to emitter installation and pipe kept free of foreign matter after flushing and prior to emitter installation.

D. Coordination of heads with planting is a requirement. In cases where irrigation and planting is contracted to separate parties, final coordination of heads shall be the responsibility of Irrigation Contractor. In the case where more than one emitter outlet is required to a single plant, Irrigation Contractor shall install emitters equal distance around base of plant.

E. Contractor shall be responsible to ensure that all turf areas receive 100% spray coverage. Contractor to add or delete irrigation heads as required to achieve desired result. If necessary, layout shall be adjusted in the field to provide uniform coverage over entire area of spray shown on the Drawings at the available water pressure.

3.6 BACKFILLING & COMPACTING

A. The trench shall be backfilled and compacted in 8″ lifts and leveled to the grade of adjacent soil. Compaction shall be 95% of the maximum density of adjacent soil. Any settling of trenches shall be brought up to grade as necessary.

3.7 INSTALLATION OF CONTROL CABLE

A. All electric control cable shall be of size as shown as specified herein and shall be installed in the piping trenches wherever possible. Pipe trench shall be partially backfilled to provide three to four inches of cover over the pipe before wire is installed. Wire shall be "snaked" into the trench as loose as possible and with as much slack as possible to allow for expansion and contraction of the wire. If it is so desired, rather than leaving slack in the wire, expansion joints in the wire may be provided at 200-foot intervals by making five to fifteen turns of the wire around a piece of 1/2″ pipe. Where it is necessary to run wire in a separate trench, the wire shall have a minimum cover of 24″.

B. All wire connections at remote control valves, whether direct buried or in control boxes, and at all wire splices shall be left with sufficient "slack" so that in case of repair the valve bonnet or splice may be brought to the surface without disconnecting the wires (24" min.).

C. Wire connections to remote control electric valve and splices of wire in the field shall be made in the following manner using Pen-Tite wire connectors and sealing cement, or approved equal:

1. Strip ends of wires and push wires through the holes of the base socket.
2. Twist wires together and mechanically bond together using crimp sleeve and crimp pliers.
3. Pull wire connection back into base socket as far as possible.
4. Apply solvent cement to outside of sealing plug then fill cavity of sealing plug completely with solvent cement.
5. Push sealing plug into base socket, using slight twisting motion, until it bottoms.
6. Push wires unseating sealing plug. This assures cement completely sealing around wire insulation and waterproofing the connection.

D. It is important the joint be absolutely waterproof so that there is no chance for leakage of water and corrosion build-up on the joint.

E. No splices shall occur between the controller and the remote control valve. If outstanding circumstances occur that require wire splices the contractor shall first send written notification to Architect for approval. Contractor shall make all splices inside a valve box with adequate slack at the ends of the wire run.

PART 4 AUXILIARY EQUIPMENT

4.1 VALVE BOXES

A. All remote control valves, unless otherwise indicated shall be installed in suitable plastic or other type valve access box of proper size as required for easy access to the valve. Access boxes shall be complete with plastic or other approved type locking cover. Keys shall be provided for the non-rusting locking covers. Valve boxes shall be CARSON or approved equal. All valve boxes in D.G. areas shall be desert tan in color, valve boxes in turf areas shall be forest green in color.

B. Controller designation shall be clearly and neatly etched into top of valve box lid. All valve access boxes shall be provided with proper length and size extensions, where ever required, to bring the valve boxes level with the finish grade.

C. Weed Control fabric shall be placed on bottom of box and wrap around piping to keep the interior of the valve box free from loose soil and weeds. A layer of pea gravel as detailed in the drawings shall also be placed within each component box.

4.2 ENCLOSURES (IF APPLICABLE)

A. The protective enclosure for the backflow preventers shall be constructed as detailed on the drawings. Padlocks shall be furnished by the Owner. All R.P.B.P. enclosures shall be spray painted with epoxy flare resistant paint, high quality color shall be as per governing municipalities guidelines. No spray cans shall be allowed and paint shall be applied professionally with appropriate equipment as approved by the governing municipality.

4.3 FIELD QUALITY CONTROL

A. Tests: Notify Architect/Engineer in writing when tests will be conducted. Conduct tests in presence of Architect/Engineer.

B. Hydrostatic Test: After new sprinkler piping and risers are in place and connected and necessary division Work has been completed and prior to the installation of sprinkler heads, control valves shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested. Test water piping and valves, before backfilling trenches, to a hydrostatic pressure or not less than 150 p.s.i. Piping may be tested in sections to expedite work. Remove and repair piping, connections and valves which do not pass hydrostatic testing.

C. Operational Test: Perform operational test after hydrostatic testing is completed, backfill is in place, and sprinkler heads installed and adjusted to final position.

1. Demonstrate to Architect/Engineer that system meets coverage requirements and that automatic controls function properly.
2. Coverage requirements are based on operation of Max. three circuits at a time.

4.4 ADJUSTING

A. After completion of grading, seeding or sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with or not more than 1/2 inch above finish grade, and plumb. Do not over spray onto walks, walls, buildings, signs or parking areas. Adjust to conform.

B. Coordinate the controller watering schedules to minimize station overlap. Submit watering schedule to Owner prior to acceptance of project.

PART 5 - CLEAN UP

5.1 CLEAN UP

A. Clean up shall be made daily as each portion of the Work progresses. Refuse and excess dirt shall be removed from the site, and walks and paving shall be broomed or washed down daily. Any damage shall be repaired to original conditions at Contractor's expense.

5.2 PROTECTION

A. Protect Work from damage until acceptance.

B. Repair or replace damaged Work at no additional cost to Owner.

5.3 PROTECTION OF EXISTING IRRIGATION

A. The Irrigation Contractor is to protect the existing irrigation system to provide 100% coverage to all existing plant material.

B. The Contractor is to supply temporary irrigation if there is work on-going within an existing irrigation system, i.e. temporary mainline, temporary lateral line, etc., to maintain uninterrupted service to all other areas. Verify existing conditions prior to bidding.

C. The Contractor is to provide uninterrupted irrigation to all existing plant material.

D. Where flood irrigation occurs and is interrupted, the Contractor is to supply temporary sprays providing 100% coverage.

PART 6 - RECORD DRAWINGS AND GUARANTEES

6.1 RECORD DRAWINGS

A. During progress of the Work, keep an up-to-date set of Drawings showing field and shop drawing modifications. Record dimensioned locations and depths for each of the following:

1. Sprinkler pressure line routing (Provide dimensions for each 100 lineal feet {maximum} along each routing, and for each change in directions).
2. Gate valves and butterfly valves.

3. Irrigation control valves
4. Control wire routing and color designation.
5. Sleeves under paving
6. Turf sprinkler heads
7. Other related items as may be directed by the Engineer/Owner's Representative
8. Maintain as-builts on a daily basis to ensure accuracy.

B. Locate all dimensions from two permanent points (buildings, monuments, sidewalks, curbs or pavements).

C. Record all changes which are made from the Contract Drawings, including changes in the pressure and non-pressure lines.

D. Record all required information on a set of blackline prints of the Drawings. Do not use these prints for any other purpose.

E. Maintain information daily. Keep Drawings at the site at all times and available for review by the Engineer/Owner's Representative.

F. Make dimensions accurately at the same scale used on original drawings, or larger. If photo reduction is required to facilitate controller chart housing, notes or dimensions must be a minimum 1/4" in size.

6.2 GUARANTEES

A. Submit for approval a written guarantee in addition to manufacturer's guarantees or warranties. All Work shall be guaranteed for two (2) years from date of final acceptance against defects in material, equipment and workmanship by the Contractor. Guarantee shall also include repairs to any part of the premises resulting from leaks or other defects in materials. Guarantee shall be signed by the Contractor and Subcontractor if applicable.

6.3 OPERATION AND MAINTENANCE DATA

A. Submit detailed operation and maintenance data for all equipment and accessories provided under this Section including assembly and part lists for each type of valve, emitter, etc., furnished to the Engineer/ Owner's Representative.

B. The Contractor shall furnish six (6) hard-copy operation and maintenance manuals that include Specifications prepared by the manufacturers of all items of equipment furnished under this Section. The manual shall include maintenance instructions, copies of approved shop and installation drawings for all equipment and manufacturers' recommended lubricant and spare parts lists.

6.4 CONTROLLER CHARTS

A. Do not prepare charts until Record Drawings have been approved by the Engineer/ Owner's Representative.

B. Provide one controller chart for each automatic controller installed.

1. Chart may be a reproduction of the Record Drawing, if the scale permits fitting the controller door. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility.
2. Chart shall be blackline print of the actual system, showing the area covered by that controller.

C. Identify the area of coverage of each remote control valve, using a distinctly different pastel color, drawn over the entire area of coverage.

D. Following approval of charts by the Engineer/Owner's Representative, they shall be hermetically sealed between two layers of 20 mil thick plastic sheet.

E. Charts must be completed and approved prior to final acceptance of the irrigation system.

INDIGENOUS LANDSCAPE SALVAGING STORING AND TRANSPLANTING

PART 1 SCOPE.

A. The Contractor shall furnish all labor, material and equipment required for pruning, boxing, excavation lifting, transporting, maintenance, storage and all other work as required by the project plans and specifications. All work and equipment shall be inspected and approved by the Landscape Architect.

B. All work performed by the Contractor shall be completed within the confines of the project limits as defined by the project plans and specifications and field verified by the Landscape Architect. The Contractor may be directed to fence, flag or stake areas or features on or adjacent to the project to be protected. The cost of providing the materials to define and protect such areas and features shall be provided by the Contractor at no cost to the Owner. The Contractor shall be responsible to replace and/or repair in kind any plant material, geologic, natural or man-made features disturbed or destroyed which were to be protected during the plant salvage operations within or outside the limits of the project. The Contractor shall be responsible to repair all areas to their previous condition and to the satisfaction of the Landscape Architect.

C. The Contractor shall be responsible to keep a daily log of the following activities: a record of the ID number of the trees boxed, the species, caliper, box size and the dates that side boxing, bottoming and moving took place. The Contractor shall be responsible to do an investigation of all underground soil, rock and surrounding area conditions using approved methods and equipment. If upon this investigation a tagged plant is found to have a decreased chance of being successfully boxed and relocated, the Contractor shall contact the Landscape Architect to review the field conditions. A decision will then be made as to whether the plant will be relocated. Individual decisions will be made for each plant in question. Substitution or other possible alternatives will be discussed at this time. The Contractor is responsible to keep a written record of all discussions and decisions.

D. Transporting of any plant material for the project shall be in compliance with all State and Local requirements. The Contractor shall be responsible to obtain all necessary permits and tags for transporting plant materials on public roadways.

E. Permits and tags shall be available to the Landscape Architect upon request.

1.01 NATIVE PLANT INVENTORY.

A. The Contractor is to use the inventory information as a reference in locating the trees, determining box size, and in preparing a bid.

1.02 TREE PRUNING.

A. Pruning of plants to be relocated shall be done in a way which removes an amount of foliage proportionate to the root system that will be eliminated by boxing. Pruning shall be done so that an aesthetic framework of branches is left, which preserves the size and best features of the tree so that the tree fills in for a balanced appearance.

PART 2 PROCEDURES

2.01 TAGGING.

A The Contractor shall identify the major limbs to be removed from each plant using flagging tape. The Landscape Architect shall be contacted prior to actual removal of limbs for approval of at least a sample of the proposed pruning.

B. Pruning shall be done so that equal amounts of foliage are removed from all sides of the plant to give a balanced look. Where there are unusual shapes and structures to the plants, remove foliage and branches to accentuate any features.

C. Cuts shall be made as smooth as possible and flush with trunks. Buts are to be made to allow minimal damage to the cambium layer of the tree and expose minimum weakness.

D. The Contractor shall have a Lindane/Anti-transparant chemical combination applied by a Certified Pesticide Applicator after pruning to prevent damage by wood borers and increase moisture retention of the foliage. Reapply 3 weeks after initial application.

2.02 BOX SIZES.

A. Box sizes are to be chosen that will maximize the chances of survival for the plant but that are within economic constraints.

B. Box sizes shall be determined by the plant inventory included with this specification booklet and shall be field verified by the Contractor.

C. The Box size shall be indicated on flagging tape attached to the plant by the contractor. Box sizes shall be based on the following:

Trunk Diameter	Box Size	Trunk Diameter	Box Size
0″ - 2-12″	24″	8-1/2″ - 11″	54″
2″ - 3-1/2″	30″	11″ - 13″	60″
3″ - 5″	36″	12″ - 15″	66″
5″ - 7″	42″	14″ - 17″	72″
6-1/2″ - 9-1/2″	48″	16″ - 20″	78″

Box sizes are stated in 6″ increments consistent with nursery industry practice and refer to the length of the top of an individual box side.

2.03 BOXING.

A. Side boxing shall be done to expose and preserve a rectilinear root ball to be enclosed by four tapered box sides with minimum damage to root system.

PART 3 EXECUTION.

3.01 MEASUREMENTS.

A.Measure the top of the root ball to be exposed and mark the outline to facilitate digging.

3.02 EXCAVATION.

A. Dig a trench around the plant using the outline above as the inside dimension. Take into consideration the direction the box is to be tipped during bottoming, adjust the orientation of the box accordingly.

B. Carefully cut the roots cleanly and flush with the side of the root ball as they are encountered.

C. Gradually cut the root ball inward as the trenching progresses to accommodate the taper of the box.

D. When the trench reaches the depth of the box, place sides in the trench and check the fit around root ball. Trim root ball as necessary.

E. Attach box sides around root ball with nails.

F. Secure box sides with banding. Banding shall be 3/4″ x .025 steel straps minimum.

G. Pack dirt tightly into any air space between box sides and root ball.

H. Water thoroughly and repack from lower sides and bottom as needed.

I. Plants shall be left side boxed up to 3 weeks. Watering shall be done as needed depending on the season.

J. Provide tag number and caliper of tree on the box itself which corresponds to the tag on the tree.

3.03 BOX MATERIALS.

A. Material specifications for construction of box sides are to be based on storage and transportation requirements. The following guidelines are for plants that are to be lifted upright as opposed to being tipped. If plants are to tipped, the Contractor shall modify the materials used to withstand the additional stress of being tipped. The Landscape Architect shall be notified for approval of modification of boxing material.

B. Horizontal box members

1″ material up to 60″ box

2″ material over 60″ box

Vertical members

1″ material up to 48″ box

2″ material over 48″ box

1″ material shall be minimum standard 1x12 #5 pine

2″ material shall be minimum standard 2x6 or 2x12 economy grade.

3.04 PLACING SUPPORTING TOPWOOD .

A. Topwood shall be placed so as to minimize movement of the plant and it's root system by anchoring securely to box and to reduce loss of soil during transportation and handling. Topwood shall be tight against trunk but should not cause scarring.

B. Measure 2x4 or 2x6 wood to fit the width of box and cut.

C. Place wood on each side of trunk. Nail wood to plant trunk and box sides.

D. Place cross members and additional supporting wood as necessary to stabilize plant and root ball based on size and orientation of tree.

E. Nail 1″ material across top of root ball, minimum 2 boards in each direction up to 54″ box sizes. Use 2″ material of boxes over 60″.

3.05 BOTTOMING.

A. The plant shall be bottomed after cutting the remaining roots, minimizing the loss of soil from the bottom of the root ball.

B. Determine direction that the plant is to be tipped. Direction shall be close so that no damage is done to the lower branches of the plant being moved, other nearby plants or other obstacles which would impede tipping to the extent necessary to attach bottom.

C. Place a stake a safe distance from trench in the direction the plant is to be tipped. Attach a "come along" and one end of the chain to the stake. Wrap other end of chain around box and secure. Cinch chain until taut.

D. Gradually undercut beneath the root ball. Cut roots cleanly as they are encountered.

E. Frequently test tautness of chain. when possible, begin to tip the box over in the direction of the stake. When box begins to tip, place a safety brace against bottom of box to prevent from falling in case of stake or chain failure.

F. As box is tipped back, nail bottom strips to box sides. Bring banding up along all 4 sides and over top of box. Tighten banding and secure with crimper.

G. Dirt lost during bottom process shall be repacked from lower sides and cause minimum disturbance to root ball.

H. Lower box down to its original orientation.

3.06 REMOVAL AND TRANSPORTATION.

A. All boxed plants and cactus shall be located within an on-site nursery designated by the Landscape Architect without damaging the plant. The Contractor is responsible for safety considerations of himself and crew during the relocation operations.

B.If a backhoe or front loader is used, place chain around box and secure to bucked of machine. Tilt bucket back and lift out of hole.

C. If a crane is used, place two cables cross-wise around box and attach to hook. Lift out of hole, care shall be taken to route the cables so that branches are not broken when the slack is taken up by lifting.

3.07 STORAGE AND MAINTENANCE.

A. The Contractor is responsible to provide optimum conditions for the plant to overcome transplant shock and maintain viability throughout the storage period. The Contractor shall protect the plant materials from vandalism and/or theft.

B. Contractor is responsible for maintenance and watering of the boxed plants throughout the storage and maintenance period. The Contractor shall be responsible to set up a drip irrigation system to water the trees for the duration of the maintenance period.

C. Watering shall be done as needed depending on the season and to keep the boxed plant materiel alive.

D. Periodically check root ball for excessive run-off caused by cavities in soil and holes in box sides. Repack soil and repair box as necessary from lower sides of box causing minimal damage to the root ball.

E. Check for insect activity at least once a week. A certified Pesticide Applicator shall apply Lindane as needed to control wood borers. Foliar chemical applications shall be made as needed to control other damaging insects.

F. If the Contractor at any time during the maintenance period is aware of a decline in the condition of the boxed plants the Landscape Architect shall be notified immediately for an Inspection.

G. Contractor shall apply a slow release fertilizer as needed to maintain a healthy appearance and condition of the boxed plants for the duration of the maintenance period.

H. The Contractor shall maintain the boxed plants in a weed free condition and trim all suckers at base of plant.

3.08 OBSTRUCTIONS.

A. Obstructions, if encountered, shall be reported to the Landscape Architect. Clean up of trash, debris, or other obstructions resulting from work performed by other trades is not the responsibility of the Contractor.

3.09 INSPECTION OF CONSTRUCTION WORK.

A. Periodic site inspection will be made by the Landscape Architect, or the Owner, to determine quality and compliance of work with contract documents. Contractor shall give Landscape Architect 24 hours notice for a required inspection. The Landscape Architect shall not provide supervision.

3.10 INSPECTION OF WORK.

A. Inspection of work for compliance with state, county, and city codes and standards shall be by the Landscape Architect.

3.11 CLEANING.

A. The Contractor, each week or as required, shall remove debris, waste, rubbish or unused construction materials from the project areas resulting from work under this contract except that excess plant material removed during the devegetation process, which may remain on-site. Any construction or storage yards shall be maintained in an orderly appearance and located as directed by Landscape Architect.

4.00 MAINTENANCE.

A. The Contractor shall maintain all salvaged materials in accordance with the specifications until materials are ready for replanting by the Landscape Contractor. Estimated maintenance period will be twelve (12) months.

B. Estimated Salvage Tree Watering Schedule (gallons per day)

BOX SIZE	SUMMER	WINTER
30″Box	5.71	2.86
36″Box	8.57	4.29
42″Box	12.86	6.43
48″Box	17.14	8.57
54″Box	20	10
60″Box	22.86	11.43
66″Box	25.71	12.86
72″Box	28.57	14.29
78″Box	31.42	15.71

4.01 TREE PLANT PROTECTION.

A. All trees and other vegetation which must be removed to perform the work shall be removed and either salvaged as indicated on the drawings or disposed of by Contractor; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

B. Trees considered by Engineer to have any significant effect on construction operations are indicated on the Drawings and those which are to be preserved are so indicated.

C. Contractor shall take extra measures to protect trees designated to be preserved, such as erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment against their trunks.

D. When injuring or removal of trees designated to be preserved cannot be avoided, or when removal and replacement is indicated on the Drawings, each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible.

E. All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

5.0 BASIS OF PAYMENT

A. Percentage payments shall be made monthly to the Contractor, based upon payment request received from the Contractor and approved by the Owner and the Landscape Architect. Ten percent (10%) of the cost of completed work each month will be retained by the Owner until final completion and acceptance of all plants that have been established in the nursery.

B. The payment of one-half of the ten percent (10%) retention shall be made 90 days after the written acceptance, with the remaining retention paid after any maintenance period, upon receipt of a payment request from the Contractor.

GLASS CRETE SPECIFICATIONS

1. SCOPE:

The work covered by this section of the specifications consists of furnishing all labor, equipment, and materials, and performing all operations in connection with the construction of exposed glass aggregate concrete, in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the contract, and to the latest edition at the time of the bid of the "Uniform Standard Specifications for Public Works Construction" by the Maricopa Association of Governments.

2 STANDARDS:

Materials, tests, proportions, workmanship and methods for concrete shall be in accordance with the specifications of "ACI Building Code for Reinforced Concrete" (ACI-318, current edition) as published by American Concrete institute, Detroit, Michigan, U.S. Patent Number #6016635 the applicable requirements of which shall be as binding on the Contractor, for this work as though written here in full.

a. Where requirements of ACI Code are less than those of governing codes and ordinances, the latter shall govern.

b. Where requirements of ACI Code are less than those hereinafter specified, this section shall govern.

3. CONCRETE MATERIALS:

Concrete materials shall conform to ASTM standard specifications as follows:

Portland Cement: ASTM C150-67, Type I

Aggregate: ASTM C33-67, maximum size of coarse aggregate of 3/4".

Water: Clean, potable and free of deleterious amounts of acids, alkalis or organic materials.

Air Entraining Agent: Grace Daravar (800) (443-0020) per ASTM C260.

Glass Aggregate: Per the recommendations of the Glass aggregate manufacturer T. B Penick & Sons Inc (1-800-558-1881) or approve equal. Contractor shall install glass aggregate of 20% 1/4", 15% of 5/16", 40% 3/8" ,and 25% of 1/2' glass aggregate size and percentage of volume.

4. MISCELLANEOUS MATERIALS:

Expansion Joint Filler (Foam Type) - Shall be a non-staining, closed cell, expanded polyethylene foam; Dow Chemical ETHAFOAM or equal as selected by the Landscape Architect. Furnish thickness specified or indicated on the drawings.

Expansion Joints - Shall be provided in accordance to the drawings. Expansion joints shall be at right angles to the slab and extend the full depth thereof; the premolded filler shall extend to within 1/4 inch of the surface.

5. REINFORCING, QUALITY, STRENGTH AND PROPORTIONS:

a. Polypropylene fiber reinforcement shall be utilized per Grace Construction Product "Microfiber of equal at the application rate of 1/2 Pound per cubic yard or equal for glass aggregate finish.

b. Type - Concrete shall be working stress concrete.

c. Strength - Concrete shall have a minimum compressive strength, in place, at 28 days, of 2500 p.s.i.

d. Slump - As determined by ASTM C143-66, shall not exceed 5 inches.

Workability - Shall be such that the concrete will fill the forms without voids or honeycombs and completely embed and bond to the reinforcing without permitting materials to separate or excess water to collect on the surface.

Only one brand of cement - shall be used, unless written permission to use another brand is granted by the Architect.

Air Entrained Concrete - shall be used wherever concrete is exposed to the weather. Proportions of entrained air, as determined by ASTM C233-66T, and C260-66T, shall be as follows:

3/8" maximum size aggregate 6-8% entrained air

6. SHOP DRAWINGS AND SAMPLES:

Submit shop drawings for approval in the form of a reproducible transparency. Shop drawings shall include location mark, spacing and details for all joints. Contractor shall install at no additional cost a minimum of 9 square feet of sample for review and approval by the Landscape Architect prior to installation.

Contractor shall provide a minimum of 1 pound of each glass aggregate specified, and one pound sealed bag of each aggregate specified for use by the City of Glendale for future repairs.

7. EXCAVATION:

Excavation for the glass finish concrete shall be made to the required depth below the finished surface.

8. FORMS:

The forms shall be of wood or metal, straight and of sufficient strength to resist springing or deviation during the process of depositing the concrete against them. Wood forms shall consist of two (2) inch surfaced plank, and metal forms shall be of an approved section. They shall be so designed that devices for holding the form in place will not cause weakness in the concrete or subsequent failure. They shall be securely staked and braced, held firmly to the required line and grade and shall not permit leakage of mortar. Where alignment includes curves, flexible strips of steel shall be used. Forms shall not be removed for at least fifteen (15) hours after the concrete has been placed. Care shall be exercised in removing the forms so that there shall be no chipping of the edges or marring of the surface of the curb or walk.

9. MIX DESIGN:

The Contractor, at his expense, shall employ the services of an independent testing laboratory to test the proposed aggregate and design concrete mixes for the type of concretes required.

The Contractor shall submit representative samples of each type of aggregate and Portland cement to the testing laboratory for analysis and preparation of the mix design of the concrete including the Glass Aggregate finish, Lithocrete, (858)-558-1800) glass seeding method as recommended by the manufacture, TB Penick & Sons to meet the standards of installation method. The aggregate shall be sampled and tested in accordance with appropriate ASTM procedures.

The mixes shall be designed in accordance with ACI 301-66, Method 2. Base the design on the size of the mixer, cement and aggregate to be used. The 28 day laboratory strength shall be 15% greater than that specified for in place working stress type concrete. Indicate the cement factor, water cement ratio and scale setting for the mixer. Proportion concrete materials in pounds and U.S. gallons.

Submit two copies of mix designs and aggregate reports to the Landscape Architect for approval at least 14 days prior to pouring of concrete. No concrete will be allowed to be poured until the mix designs have been approved.

The designed mixes shall be used as long as aggregate characteristics remain unchanged. Upon significant changes in aggregate, prepare new mix design.

10.CONCRETE MIXING:

All concrete shall be Ready-Mix concrete, forth in ASTM C94-65.

11.EMBEDDED ITEMS:

Build in all sleeves, inserts, anchors and similar items required to be built in.

Place items to be built in prior to placing concrete. Accurately position, and support. Concrete around embedded items shall be vibrated to ensure a good bond.

12.JOINTS:

Form joints in concrete work according to the drawings and specifications herein. Place concrete in one monolithic pour between joints.

13.PLACING CONCRETE:

No concrete shall be poured until all reinforcing steel for the pour is in place and the Landscape Architect's permission to pour has been given for each pour.

Sufficient transporting equipment, clean and in good working order, shall be on hand before work is begun. Thoroughly clean forms before placing concrete. Dampen masonry and porous earth to be contact with the concrete.

Placing of concrete shall conform to ACI-301-66 and LACI 614-59, "Recommended Practice for Measuring, Mixing and Placing Concrete." Place concrete as continuously as possible until pour is complete so that no concrete is placed against concrete that has attained its initial set, except at authorized joints.

Place concrete as near as possible to its final position. Prevent segregation. Use chutes or tremies as necessary. The maximum free drop shall be 5 feet. Compact during placing with internal vibrators. Work around reinforcement, embedded fixtures and into form corners.

Place concrete per the recommendations of the Glass aggregate manufacturer. Contractor shall install glass aggregate of 20% 1/4", 15% of 5/16", 40% 3/8" ,and 25% of 1/2' glass aggregate size and percentage of volume.

Glass Aggregate shall be seeded at a minimum rate of 3/4 pound per square foot and installed per the glass aggregate manufacturer.

Concrete that has obtained its initial set shall not be placed in the forms and shall be discarded. Retempering of concrete will not be permitted.

SEALING:

Contractor shall seal glass aggregate concrete surface using Lithocrete Sealer or approved equal

Apply sealer per manufacturers recommendations.

CONCRETE PAVERS

1. GENERAL

1.1 SUMMARY

SECTION INCLUDES

Requirements for the proper installation of decorative pavement - interlocking concrete pavers.

Decorative pavement provided under this Section is intended for use in areas subject to vehicular traffic.

APPROVED EQUAL

All proposed substitutions shall be submitted, at least 21 days prior to their use, for approval by Resident Engineer.

1.2 REFERENCES

AMERICAN SOCIETY FOR TESTING AND MATERIALS [ASTM]

ASTM C144 Specification for Aggregate for Masonry Mortar

ASTM C170 Compression strength min. 2,000psi.

ASTM C99 Modulus of Rupture min. 300psi.

ASTM C97 Absorption by Weight max.20%

Density max. 140lb/qubic ft.

ASTM C616-80 Standard Specifications for Sandstone Building Stone.

1.3 SUBMITTALS

In accordance with special provisions, and MAG sections 105, 106, and 129 and all other applicable sections, two samples of each, vehicular thickness interlocking concrete pavers shall be submitted to the Resident Engineer and City of Phoenix within 30 days of notice to proceed to indicate colors to be supplied on this job. Colors as specified on the plans.

The purchaser or his authorized representative shall be accorded proper facilities to inspect and sample the units at the place of manufacture from the lots ready for delivery.

Sample and test units in accordance with ASTM Method C 140.

The nominal size of the pavers shall modulate to even, one-foot increments based on a tight hand placed joint spacing. General contractor and paver contractor shall make appropriate adjustments to minimize cutting in pavers through coordination with concrete flatwork dimensions, careful installation of paver spacing as approved by the Resident Engineer to avoid small cuts and slivers.

2.0 PRODUCTS

2.1 MATERIALS

Interlocking Concrete Pavers - All interlocking concrete paving stones shall as manufactured by Pavestone Co. Superlite Block Incorporated or approved equal and shall conform to the following specifications.

Subgrade Preparation: The subgrade shall be well drained and have adequate and uniform load-bearing characteristics. It shall be graded such that the thickness of the concrete will be uniform. Area shall be treated in accordance with Section 430 of the MAG Uniform Standard Specifications.

Aggregate base Course (ABC) In accordance with MAG Section 702, Table 702-1.

Pavers shall have a Minimum compressive strength of 8,000 P.S.I. in accordance with testing procedures ASTM C-140.

Materials used to manufacture interlocking concrete paving stones shall conform to the following:

Cement-ASTM C-150 (Portland Cement)

Aggregates - ASTM C-33 (washed, graded, sand and rock, no expanded shale or lightweight aggregates)

Size, shape, design and colors shall be in accordance with details and as noted on plans.

Absorption shall not be greater than 5% with no individual unit absorption greater than 7%.

Rejection, In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of test units fails to conform to the specified requirements, the entire lot shall be rejected. The expense of inspection and testing shall be borne by the manufacturer unless otherwise agreed.

Sand Laying Course - shall be a concrete sand:

sieve-size	3/8 in.	No. 4	No. 8	No. 100	No. 200
% passing	100	32-100	61-100	1-12	0-7

Thickness of sand laying course shall be uniform to insure an even surface. The designed thickness shall be a maximum of 1 inch.

The sand laying course shall be provided and installed by the paving stone installer.

Portland Cement Concrete Base Course – Crosswalk Intersections:

Thickness of Concrete Laying Course shall be a minimum thickness indicated on the drawings. See details for further requirements.

Portland Cement Concrete shall conform to the requirements of the Uniform Standard Specifications for Public Work Construction by the Maricopa Association of Governments Section 725.

Self Adhesive Filter Fabric:

A self-adhesive filter shall be installed per details over all construction, contraction and expansion joints between sand laying course and concrete base. See details and plans. Width shall be minimum of 2 feet.

The self-adhesive filter fabric shall be installed by the paving stone installer.

2.2 EQUIPMENT

Furnish a 10-foot straightedge capable of accomplishing the level test specified for the aggregate base course and the finished decorative pavement.

3. EXECUTION

3.1 PREPARATION

Furnish all the necessary labor, Material, tools, and equipment to complete the proper installation of the decorative pavement interlocking concrete pavers.

3.2 CONSTRUCTION

Compact the subgrade soil to a minimum of 95 percent density.

Place the base course over the subgrade:

Use a Class B Concrete base course. Concrete shall be in accordance with MAG Section 725, Class B. The water content shall be the minimum practicable, and the slump shall not exceed four inches. A normal set or retarded set, water reducing admixture may be used, but the concrete substrate shall contain no other admixture, such as those containing calcium chloride or fly ash.

Set the surface of the aggregate base plus concrete base elevation to bring the sand course plus the thickness of the paving stones to the desired finish elevation of pavement.

Retain all edges to secure the perimeter.

Construct concrete headers, concrete retention curbs, precast edge units, or similar edge retention devices straight and set to final grade.

For interlocking concrete pavers provide a course of sand. Thickness of sand-laying course shall be uniform to insure an even surface. The designed thickness shall be a minimum of 1 inch.

Paving stones shall be installed hand tight and level on the undisturbed sand-laying course. String lines shall be used to hold pattern lines true. Installation shall start from a corner or straight edge and proceed forward over the undisturbed sand-laying course.

A roller vibrator or plate vibrator capable of 3,000 to 5,000 pounds compaction force shall be used to vibrate the paving stones into the sand-laying course with the surface clean and joints open.

Plaster sand shall be spread over the installed paving stones and vibrated into the joints between the stones. Additional sand application and vibrator passes and brushing is required to insure joints are completely filled.

Excess sand shall be swept into the joints or disposed of from surface area.

Furnish decorative pavement and install it true to line and grade.

Install decorative pavement to coincide and align with the adjacent work elevation.

Perform any cutting of the pavement stone using a saw.

Lay the paving stones starting from an area allowing to from a true 90-degree corner.

Any on site sawing shall utilize equipment that produces no dust. For concrete paver cutting, whenever possible, no cuts should result with a paver less than 1/3 of original dimension. Concrete pavers shall be cut with clean edge.

3.3 REPAIR/RESTORATION

Remove and replace any broken or damaged pavers.

3.4 FIELD QUALITY CONTROL

Site tests:

Test the sub grade material to ensure the relative density is 95 percent.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Interlocking Concrete Pavers will be measured by the square foot (SF) constructed, tested, and accepted.

4.2 PAYMENT

Project Cost Estimate

Engineer's Construction Cost Estimate
Dec-04
Project: ASU East Backus Mall SHERMAN GROUP

#	Quantity	Description	Unit	Unit Price	Total
I	1	Mobilization / Demobilization	LS		$76,891.88
II	1	Traffic Control	LS		$15,403.30
III	1	Contingency	LS		$138,629.66
1	1	Grading and Necessary Fill	LS	$20,000.00	$20,000.00
2	10227	Sawcut and Remove Concrete Walk, Slabs and Drives	SF	$2.00	$20,454.00
3	3486	Sawcut and Remove Concrete Curb and Gutter	LF	$5.50	$19,173.00
4	8290	Sawcut and Remove Existing Asphaltic Concrete Pavement	SY	$5.00	$41,450.00
5	2	Remove and Reset Existing Survey Marker in Handhole	EA	$220.00	$440.00
6	10	Adjust Frame and Cover for Survey Monuments, Water Valves, Sewer Cleanouts And GasValves to new Grade MAG Det. 270	EA	$260.00	$2,600.00
7	6	Adjust Manhole Frame and Cover to New Grade as Needed per MAG Stnd. Det. 420-2	EA	$550.00	$3,300.00
8	3	Relocate Existing Fire Hydrant	EA	$2,000.00	$6,000.00
9	50	Salvage and Reuse Existing Trees per Caliper Inch	CA	$85.00	$4,250.00
10	7	Remove Existing Trees	EA	$500.00	$3,500.00
11	3	Remove Existing Palms	EA	$600.00	$1,800.00
12	3	Salvage and Reuse Saguaros	EA	$750.00	$2,250.00
13	1	Underground Utilities	LS	$100,000.00	$100,000.00
14	2	Remove Utility Pole	EA	$900.00	$1,800.00

15	4	Remove Existing Street Lights	EA	$1,200.00	$4,800.00
16	4	Relocate Existing Street Lights	EA	$10,000.00	$40,000.00
17	4	Relocate Existing Traffic Control Signs Including Poles and Foundations	EA	$200.00	$800.00
18	3	Remove Existing Traffic Control Signs Including Poles and Foundations	EA	$200.00	$600.00
19	1	Remove Existing Catch Basin	EA	$1,000.00	$1,000.00
20	70	Remove Existing Catch Basin Connecting Piping	LF	$20.00	$1,400.00
21	1	Install New Catch Basin	EA	$2,000.00	$2,000.00
22	27	New 15” RGRCP Connecting Pipe and all Necessary Elbows, Joints	LF	$100.00	$2,700.00
23	1184	New 6” Curb and Gutter Type ‘A’ per MAG standard Det-220	LF	$18.00	$21,312.00
24	512	New Rolled Curb and Gutter Type ‘C’ per MAG standard Det-220	LF	$20.00	$10,240.00
25	250	New 6” Single Vertical Curb Type ‘A’ per MAG standard Det-222	LF	$15.00	$3,750.00
26	130	Construct new 5’ Curb and Gutter Transition	LF	$16.00	$2,080.00
27	5830	New 8” Exposed Aggregate Header	SF	$9.00	$52,470.00
28	15910	New 8” Concrete Sidewalk Medium Salt Finish	SF	$8.00	$127,280.00
29	4178	New 8” Concrete Sidewalk With Crushed Glass Surface	SF	$20.00	$83,560.00
30	2747	New 8” Concrete Sidewalk With Embedded Black Mexican Beach Pebbles	SF	$20.00	$54,940.00
31	1322	New 8” Thick Concrete Header With Embedded Copper Plated Steel Insert	LF	$25.00	$33,050.00
32	3184	New 4” Exposed Aggregate Header Color to be ASU Grey	SF	$6.50	$20,696.00

33	10308	New 4" Concrete Sidewalk Medium Salt Finish	SF	$5.50	$56,694.00
34	485	New Concrete Sidewalk to Match Existing in Color, Thickness, Pattern	SF	$5.50	$2,667.50
35	51	Pedestrian Lighting Complete	EA	$3,800.00	$193,800.00
36	1	Electrical Connection Complete	LS	$195,000.00	$195,000.00
37	16	New Bollards	EA	$800.00	$12,800.00
38	9	New Tree Grates	EA	$950.00	$8,550.00
39	23	New Trash Receptacle	EA	$800.00	$18,400.00
40	48	New 6' Bench	EA	$750.00	$36,000.00
41	7	New Bike Racks	EA	$700.00	$4,900.00
42	216	New Embedded Retaining Wall / Sidewalk Combination as per Details	LF	$70.00	$15,120.00
43	216	New Handrail as Designed by ASU East	LF	$40.00	$8,640.00
44	116	New Retaining Wall / Cantilever Bench Combination	LF	$170.00	$19,720.00
45	2	New Handicap access ramps	EA	$450.00	$900.00
46	2	New Handicap access ramps "Scoop Ramp"	EA	$500.00	$1,000.00
47	3	Install new "Pad. Crossing Ahead" signs	EA	$200.00	$600.00
48	60	Pavement marking (yield line)	LF	$5.00	$300.00
49	60	Pavement marking (12" wide white stripe)	LF	$4.00	$240.00
50	870	Pavement marking (4" wide yellow stripe)	LF	$1.00	$870.00
51	390	Pavement marking (4" wide white stripe)	LF	$1.30	$507.00
52	4	Preformed Painted Handicap Insignia	LF	$250.00	$1,000.00
53	3217	Subgrade Prep. for AC Pavement	SY	$8.00	$25,736.00
54	3217	Aggregate base course 6"	SY	$10.00	$32,170.00
55	374	2" Thick Asphaltic Concrete base	TN	$200.00	$74,800.00

56	184	1" Thick Asphaltic Concrete base	TN	$200.00	$36,800.00
57	1	Intersection Traffic Table/ Pedestrian Crossing - Concrete work only	LS	$70,000.00	$70,000.00
58	2418	Concrete Pavers	SF	$10.00	$24,180.00
58	1540	Topsoil for Berms	CY	$6.00	$9,240.00
59	240	1 Gallon Ground Cover	EA	$9.00	$2,160.00
60	527	5 Gallon Shrub	EA	$22.00	$11,594.00
61	129	15 Gal. Accents	EA	$75.00	$9,675.00
62	133	36" Box Trees	EA	$500.00	$66,500.00
62	6	52" Box Trees	EA	$1,000.00	$6,000.00
63	169	Landscape Boulders	TN	$60.00	$10,140.00
64	590	Turf Seed	SF	$8.00	$4,720.00
65	279	1/4" Minus Decomposed Granite	CY	$60.00	$16,740.00
66	475	Stabilized DG	SF	$6.00	$2,850.00
67	2	1.5" Water Meter Service, including all Pipe, fittings, trenching and connection to water supply	EA	$5,000.00	$10,000.00
68	2	1.5" Reduced Pressure Backflow Prevention Unit and Cage	EA	$2,500.00	$5,000.00
69	2	Rainbird controller 12 station	EA	$4,000.00	$8,000.00
70	1	Irrigation System Complete	LS	$35,000.00	$35,000.00
		Grand Total			$1,959,633.33

Project Construction Drawings

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